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ABSTRACT

This report describes a program designed to promote relevance in the lower division curriculum at Our Lady of the Lake College in San Antonio, Texas. It was decided that the best means to be used is a multidisciplinary course that utilizes the method of problemsolving as the basis. Therefore, a course combining the social and behavioral sciences was created. Results show varied opinions as to the feasibility of the experimental program. It is pointed out that it is difficult to truly assess such a program when 80% of the students' curricula remained traditional. However, it is felt that the problemsolving emphasis focusing on community projects has unlimited capabilities for embarking students on programs of study to accept urban planning and management positions. (HS)

FINAL REPORT
Project No. 1 F008
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A COLLEGIATE UNDERCLASSMAN CURRICULUM FOR THE BEHAVIORAL/ SOCIAL SCIENCES EMPLOYING A PROBLEM-SOLVING APPROACH

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December 1971

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

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The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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SUMMARY

In many centers of higher education, students give evidence that their course work is fragmented, with little or no relevance to their own personal experiences up to this time, and they can see no interrelatedness among the courses they take. How, they ask, is college different from high school? Very often their freshmen and sophomore courses--many of which are survey courses--seem to be a tedious and monotonous repetition of high school content, modified somewhat by the teaching approach of traditional college lectures, each course being an entity in its own right, and insulated from their other courses, of which there is limited choice.

In order to counteract this seemingly fragmented and traditional approach occurring with college survey courses on the freshmen and sophomore levels, Our Lady of the Lake College undertook to provide a more effective learning situation. Before the innovation, the student took five courses for three credit hours each in traditional survey courses to meet the required general knowledge in the Social and Behavioral Sciences.

Following a rather extensive investigation of existing curricula at various colleges and universities, no appropriate curriculum was found to suit our needs. Hence, the faculty of Our Lady of the Lake sought answers to the need for an innovative teaching approach. The disciplines of the Social and Behavioral Sciences seem to blend together to give the freshmen and sophomores a unified and comprehensive curriculum on which to build the later years of their college work. By combining these, it seems possible to correct the present-day compartmentalized curriculum characteristic. Many institutions have joined the disciplines of the Liberal Arts or Humanities, but each of these groupings seems to lack an essential element of cohesiveness. Moreover, a program was desired which incorporated several innovative learning approaches---student involvement in planning and teaching, an interdisciplinary approach, a problem-solving approach, and provision for individual projects or research. Consequently, we felt that only by integrating the unique contribution of each discipline chosen from the Social and Behavioral Sciences is it possible to present a truly interdisciplinary approach in curriculum development.

Besides the problem of fragmentation, another criticism often leveled against the traditional college approach concerns content matter. With the present bludgeoning of factual information in today's mechanized society (factual material doubled in the last two years), it is evident that colleges must adapt themselves. No longer is the professor the one and only source of knowledge who funnels his facts into students. College professors and administrators realize that no one single person can be expected to encompass all that can be known in his particular field. The rapid accumulation of factual knowledge prevents this.

Another recent development in the educational field is that modern research shows that optimal learning takes place most effectively when the student is actively and totally involved in the learning process. Thus, for colleges to cope with the recent factual explosion and to utilize the findings of recent learning experiments for the student's maximum good, mandatory innovations are essential. The purpose of this research was to develop a curriculum design which would not only correct these obvious errors of our present educational system but will also stimulate the student to a greater self-motivated acquisition of knowledge. Thus, knowledge becomes more meaningful to him because of his greater involvement. The student is to be taught not just to accumulate more and more facts, but is given a broader base of operation or general method. Thus, the student is able to assimilate all types of knowledge regardless of the specific factual concepts with which he might be dealing.

The specific instrument we envisioned to fill this two-fold role of enabling the student to learn most effectively and to apply a universal methodology in his learning skill is the technique of problem-solving. True, the student has been using this process, whether consciously or unconsciously, since his youth. This does not thereby negate its usefulness on the college level. On the contrary, this makes it a more feasible focal point in the learning process since he is already familiar with it. The innovative part of the project is the way in which the process is presented to the student. The students in a Field Test group were asked to: name problems which they have encountered in their own particular circumstances; discuss the different methods one may use to solve the problems; examine the method of analysis peculiar to the historian, the sociologist, the political scientist, and so on for each discipline; decide which method to adopt; test the hypothesis; evaluate its effectiveness; and revise his solution accordingly.

At this time, the greatest need of the modern student is to learn a process rather than accumulate facts. Educational leaders must attempt to fill this need even though foreseen difficulties do exist. Therefore, we were eager to test our hypothesis that learning the process of problem-solving promotes greater intellectual curiosity, openmindedness, and educational creativity, than is currently being fostered by other present educational patterns. Such an attitudinal change would bring about more involvement on the social, political, cultural, religious, and humanistic levels, thereby equipping the student to be a more effective citizen in the twenty-first century.

The authors are fully aware of the fact that "process learning" of this nature focuses on an attitudinal change within the student. This is a goal more nebulous and perhaps harder to achieve and evaluate than the more concrete accumulation of facts.

Well defined goals, skills and objectives were a special concern of those developing the course. The principle goal was to teach students to think and to use information as the vehicle in the development of thought processes. Envisioned skills included: (A) ability to define a specific problem(s) clearly and concisely, (B) the recognizing and weighing of values for alternative courses of action, and (C) the interpreting of data, distinguishing of facts and logical reasoning for correlating facts. The objectives delineated were: (A) provide fundamental principles and basic methods of inquiry in the study of man and his social and physical environment, (B) provide a learning situation with a broad human focus with emphasis on personal and interpersonal student concerns, and (C) emphasize how the good and bad effects of science and technology affect the social and political framework.

Well founded convictions emerging from the research experience include the following:

1. Involving the student as an active participant in the classroom through a community oriented problem-solving project is an effective learning situation.

2. Problem-solving is an unfamiliar technique and learning situation for freshmen students and is well worth the time and effort in the classroom.

3. Multiple instructors and subject matter make broad multi-disciplinary courses rather unacceptable since students desire selection of courses on the basis of campus reputation of a course and its instructor.

4. Freshmen find the broad multi-disciplinary approach confusing when the other 80% of their semesters work is based on the traditional classroom.

5. Freshmen students are pre-conditioned to fragmented or compartmentalized learning rather than integrated learning.

6. Integrating two or three disciplines appears to be the maximum--too broad a scope of integration appears to compromise effectiveness.

7. One instructor-one classroom is the epidemy of simplicity thus any interdisciplinary course is a violation of simplicity.

8. The proper circumstance for the success of interdisciplinary courses is to have a special faculty and special department for that part of the curriculum.

9. Instructors become rather non-effective with only sporadic lectures or with classroom times of limited duration and as a result feel no commitment to the students.

10. The normal classroom course load formula applied to multidisciplinary courses can render them uneconomic.

11. Master Attitude Scales yield no productive measure over a period of time as short in duration as a 15 week semester but over a four year period could be an effective evaluation instrument.

12. Master Attitude Scales are an ineffective measuring instrument in comparing a single three hour course in a semester when 80% of the rest of the student's work is in the traditional classroom.

13. Broad scope multi-disciplinary courses are difficult for the majority of freshmen students to acclimate themselves to.

14. A multi-disciplinary course based on the community and drawing heavily on the problem-solving process is very beneficial.

The content of the multi-disciplinary course combined with the problem-solving emphasis has been introduced at a particularly opportune time. An entire new occupational field in environmentalism is opening up when Liberal Arts and teaching certification, especially for the social sciences, are facing greatly restricted job markets. The capability for teaching environmentalism at the secondary level is still in the future and is of assured but unknown quantity. The problem-solving emphasis focusing on community projects has unlimited capabilities for embarking students on programs of study to accept urban planning and management positions.

INTRODUCTION

To teach the desired process of problem-solving, a Project Model (Human Ecology) was created. We developed a unit (one of four in a total Project) which focused on the problem-solving process. In the introductory unit which was one semester in length, problems which were directly related to the student in his home and civic communities were emphasized. Following this will be three comparable units each in turn focusing on state, national, and international problems respectively. Ideally, the problems on each of the four levels will become progressively more complex and will require competency in the problem-solving process peculiar to each of the number of diverse disciplines included. A Planning Committee in conjunction with student assistants ascertained and categorized concepts and materials peculiar to each discipline. Problems which required the utilization of the problem-solving techniques of each of the disciplines were examined by a pilot group consisting of student teaching assistants and teaching faculty. Problems which required a student to combine the techniques of two or more of the disciplines were handled through individual projects as the freshman student continued through his semester's work.

The multi-disciplinary characteristic of the curriculum developed was expansive in scope. The academic disciplines directly involved with the first unit to be developed were: Sociology, Economics, Social Work, Religious Studies, History, Political Science, Speech Pathology, Biology and Geography. The faculty of other divisions (i.e. Worden School of Social Work) were called upon when panel discussions or lectures were presented for the Field Test group.

Other interdisciplinary programs have been, and are presently being, tested in various schools of higher education. Some of the experiments range from a whole university, so oriented, down to single courses. Some of these are:

1. Colleges of Lindenwood, St. Charles, Missouri
2. University of Wisconsin, Green Bay, Wisconsin
3. University of California at Berkeley, Berkeley, California
4. College of St. Benedict, St. Joseph, Minnesota
5. Texas Lutheran College, Seguin, Texas
6. Austin College, Sherman, Texas

A cursory study, however, revealed the following hypotheses:

1. Most existing interdisciplinary approaches are within the Humanities or Creative Arts.
2. Those interdisciplinary courses already being offered do not meet the envisioned needs at Our Lady of the Lake College in Social/Behavioral Science.
3. Student evaluation forms for individual courses in the past offered at Our Lady of the Lake College established the need for introduction of interdisciplinary approaches.

4. Student involvement through curriculum planning and teaching assistantships is a desired focal point at Our Lady of the Lake.
5. The problem-solving approach is more productive than the accumulation of purely factual knowledge.
6. The problem-solving approach is conducive to student involvement during a college course and is therefore an effective learning experience.
7. A desired goal for educational instruction today is the producing of attitudinal changes within the student rather than just the accumulation of factual knowledge.
8. It is possible to create an innovative curriculum design that is both interdisciplinary and employs the problem-solving approach.
9. A multi-disciplinary, problem-solving curriculum design can be field-tested and evaluated whereby its productive adoption can be substantiated.
10. Multi-disciplinary, problem-solving curriculum designs can be most productive when introduced at the earliest possible time in the program of studies of college students (i.e., freshman/sophomore years).

In this project, professors from the Social and Behavioral Science disciplines served as the central core in planning and testing a multi-disciplinary curriculum. A high degree of student involvement in planning and utilizing student assistants along with the teaching faculty was felt to be mandatory. The inclusion of additional disciplines (i.e., those outside the Social and Behavioral Sciences) in the research program with their teaching faculty was also felt to be mandatory when it was appropriate. The curriculum design was a first unit in an expansive combination of the two fields. The unit was designed to emphasize the understanding of the process of problem-solving with a special focus on attitudinal change occurring within the student.

The interdisciplinary characteristic of the developed curriculum was expansive in scope due to: the number of disciplines involved, the involvement of student assistants, the number of faculty involved, and the amount of subject matter to be spanned. Thus, the total curriculum design will extend over the freshman/sophomore years. The term "unit" is used because the entire curriculum design is to be looked upon as a sequential, progressive, and integral whole.

The research and development project of eighteen months duration focused on the development and testing of the first unit in the sequence as a model for succeeding units. The project to determine the best curriculum structure for both an interdisciplinary, and a problem-solving approach in the classroom consisted of five separate phases.

Phase 1 -- Planning. (1) personnel selection was scheduled in the following approximate sequence: (A) appointment of Project Director: Nile B. Norton, Ph.D.; (B) appointment of Assistant Project Di-

rector: Sister Janet Griffin, Ph.D.; (C) appointment of ten project members: James Lonergan, Ph.D.; Sister Frances Jerome Woods, Ph.D.; Sister Lourdes Leal, Ph.D.; Irving Seligmann; Delbert Weniger; Albert Kippes, Ph.D.; Sister Dorothy Hunter; Sister Mary Elizabeth Jupe; Marguerite Kneip; Tom Ashbaucher; (2) search of all available literature on multi-disciplinary curriculum designs, multi-media resource centers, programmed learning, and commercially-developed tests and measurements; (3) develop an annotated bibliography from the available literature; (4) provide a synthesis of the literature through an interim report; (5) perform visitations to other institutions; (6) define the day-to-day classroom activity (i.e. general schedule arranged on a Monday, Wednesday, Friday schedule with Monday being large group activity; Wednesday small group activity; and Friday, individual research activity); (7) prepare necessary syllabi and study guides; and (8) select multi-media materials.

Phase II -- Student Assistant/Faculty Training. (1) selection of the five student assistants to be employed in the Phase III Field Test, (2) five primary faculty members selected to participate in an Interterm course offering, (3) volunteer enrollment of additional junior/senior-level students for Interterm, (4) students and faculty working through the Model unit using study guides and resources, (5) additional multi-media material selected or developed, (6) revision and publication of required number of copies of syllabi and study material for sixty students in the structured group field test for spring semester, 1971.

Phase III -- Field Test. (1) registration of sixty students as a Field Test group, (2) administration of Master Attitude pre-tests to both the Field Test group and the group following the traditional curriculum, (3) working through the Model unit on a Monday, Wednesday, Friday schedule with fifty-minute classroom sessions throughout the spring semester, (4) post-test of those same students throughout who were in the two groups having taken the pre-tests, (5) submission of all instructor evaluation and student self-evaluations to Projet Director.

The student teaching assistants attended all large group sessions which normally were scheduled on Monday. The large group sessions consisted of panel discussions, film, lectures, symposiums, or other comparable activities. The main emphasis of the Wednesday meetings were group discussions. The student assistants contributed substantially here, but the responsibility was still with a primary faculty member as supervisor. The maximum size for groups undergoing this activity was twelve. The major contribution of the student assistants was their work with freshemn during the individual study or research activity normally falling on the Friday schedule.

During his individual study time, the student was also required to have personal interviews, no less than four in number, with instructors representing different academic disciplines. The guidance rendered a freshman in accomplishing his individual research project was shared somewhat equally between student assistants and primary instructors.

Phase IV -- Analysis and Revision. (1) Project Director's review of evaluation devices; (2) analysis of contrasting results of pre-tests and post-tests, administered to the control groups; (3) analysis of results of the evaluation instruments used in the Field Test; (4) student assistant/faculty critique of day-by-day activity of Field Test, syllabi, study material; (5) revision of old materials or development of new; (6) production of new materials for entering freshmen for fall 1971.

Phase V -- Preparation and Submission of Final Reports. (1) preparation of final reports by the Project Director and Secretary, (2) consultation with primary faculty members in preparation of reports, and (3) submission of reports.

Primary faculty members were full participants in Phases I - IV and also consultants for Phase V. During Phase III their prorated release time was equivalent to one-half of a semester (three credit hour) course. Their primary work in Phase III consisted of being panel participants, supervising small group discussions, conducting individual student conferences, and submitting instructor evaluations on students.

Community leaders from the surrounding area and members of the local academic community were obtained as panel discussion members. Wherever possible, the expertise at our own college was utilized in the non-Social and Behavioral Sciences fields before consulting faculty from other institutions.

The separate departments to constitute a Committee and create the necessary courses were identified. The beginning of the project occurred with the appointment of a committee chairman. The Human Ecology committee was comprised of the following departments of disciplines: Biology, Sociology, Psychology, Philosophy, Religious Studies, Economics, Political Science, History, Geography, Home Economics, Physical Education, and Speech Pathology. Before planning discussions had been completed by the committee both Chemistry and Education had ad hoc members attending all meetings.

Almost from the start of the Human Ecology (HUEC) committee activities two things became apparent. First, what the committee envisioned was a new approach. It was innovative due to scope, content and methodology. Secondly, the committee could not find a model, textbooks nor people with experience which fulfilled the need. The committee considered team teaching, combined courses, mini-courses, guest lecturers, small group discussions, individualized instruction, etc. What was sought was to be able to take advantage of all of the best assets of each of those. Content, methodology and grade level differentiated the committee's envisioned requirements from anything then known to exist.

A basic plan, flexible enough to allow for transference, needed to fit into the present scheduling arrangenent of the college. Since the design, HUEC: Community, was for first registration freshman students a Monday, Wednesday, Friday schedule with fifty minute classroom contact time was selected. The basic methodology was Monday (large group activity), Wednesday (small group discussion), and Friday (individualized study). From this point the committee work led to a selection of central themes for each week's activity, constructing objectives for each week and deciding on content and evaluations.

Another decision point arose early in the consideration of the methodology for the course. This concerned a point of emphasis that would be concentrated upon during the Human Ecology course offerings. Was the course to create a critical ability relative to Human Ecology? The former was desired, but without leaving it there, the point of emphasis needed to be the ability to discern solutions after an awareness and critical ability were achieved. Thus, problem-solving joined the interdisciplinary approach as a key elements of the course.

The principal remaining consideration was an evaluation of the students in their course work and the evaluation of the course itself. Each student is required to perform at an acceptable level in examinations based on the content material of the course. Individual student evaluations are submitted by both primary instructors and advanced level undergraduate students assisting the primary instructors while working with assigned groups throughout the course. The primary instructors rotate among the discussion groups throughout the semester.

Further elaboration on the primary instructors and the advanced students enrolled for practicum credit is in order. Based on a projected enrollment of sixty freshman students taking the course on a voluntary basis the first time it was offered, five primary instructors were designated based on a desired size (twelve students) for small group discussions. One instructor each from the following were designated primary instructors: (1) Sociology (Milton Rhodes), (2) Political Science (Irving Seligmann), (3) Geography (Sr. Dorothy Hunter), and (4) History (Sr. Janet Griffin). The HEW grant project director, Dr. N. B. Norton, was the fifth primary instructor designee. Supplementing this in a closer approximation of individualized instruction, five advanced level undergraduate students were selected to enroll in a practicum course for credit to work with the freshman students. The primary instructors rotate weekly among the groups comprised of twelve students whereas the practicum student works with the same group throughout the semester.

One attempt at evaluation of the course itself was the selection of commercially available standardized master attitude scale measures available from the University of Purdue. These were used both as a pre-test and a post-test to ascertain, if possible, a measurable differentiation between the students taking HUEC: Community and those taking the traditional courses offered at the college.

III METHODS

To test the results of the Human Ecology course offering, two groups were taken into consideration. The first group consisted of the freshmen students enrolled in the new multidisciplinary, problem-solving course itself. The second group was secured through administration of Master Attitude scales to students enrolled in freshman level English courses. Complete anonimity was offered the students so a considerable variable interjected itself from the start. There was no way to be positive that those completing both tests were identical. There is little doubt however that the traditional classroom group was identical enough in both to use it as a comparative measure.

The number of freshmen enrolled in the Human Ecology course did not number half as many as the sample of the freshman group enrolled in traditional courses. This constituted a minor problem in the comparative analysis. Reducing the size of the traditional classroom group by random selection proved statistically valid and thus we were able to negate the groups being of dissimiliar size.

The beginning intent was to perform a statistical analysis of only those students enrolled in the Spring, 1971 semester. Within the time span of the investigation we were also able to administer the Master Attitude pre-test and post-test to a new group, Fall 1971, of HUEC 150 students. We feel this adds immeasurably to the analysis of the course. We are now able to make statistical comparisons between two different HUEC 150 groups and we are able to include in our comparison three pre-test groupings to check the homogenity of Our Lady of the Lake College students at a particular point in their academic careers. It might be better stated that an attitude model of our student is now more feasible to establish. It also gives us a better perspective of the Human Ecology course since the Spring, 1971 was the first time it had ever been offered on the campus to freshmen students.

The chief reliance has been upon comparative analysis of "T" score for the two groups. Also taken into consideration are ranges, means, medians, standard deviations, and frequency distributions. Refer to appendix A for further information on: Master Attitude Scale form, attitude categories tested, and means for scoring Master Attitude scales. Refer to appendices B and C for statistical data.

The Master Attitude scales administered included: (A) Toward Any Institution, (B) Toward Any Defined Group,(C) Toward Any School Subject, (D) Toward Any Vocation, and (E) Toward Any Proposed Social Action. These were felt to be compatable with the objectives of the HUEC 150 course and broad enough in coverage to ascertain meaningful degrees of change in particular areas. Each of the above scales had five specifically identified categories within their broad area. This allowed interpretation between the broad areas and also comparisons and interpretations of specific categories.

The first work in the interpretation process was to understand something about the typical freshman at Our Lady of the Lake if we were to understand his attitudes and draw any valid conclusions about changes in attitude. The first predominate characteristic is the male/female distribution ratio. The 1970-71 freshman class, based on only new students entering the college, consisted of 216 women and 63 men. Another significant characteristic concerned the ethnic origin of the new freshmen:

Ethnic Category	Women	Men
Negro	14	6
Mex. Am.	148	43
Anglo	52	11
Oriental	0	1
Am. Indian	0	0
Other	2	2

Perhaps of equal inportance for our attitude measurement was the geographic origin as a characteristic of our student model. Only 10.3% came from other states. These were well scattered among 16 states and therefore of no great influence compared to the 89.7% having the state of Texas as their origin. In addition, 67.5% were local San Antonio students. Thirty-seven other Texas cities supplied 32.5% of the new freshmen but the heavy concentration here is from South Texas and the area surrounding San Antonio. Among the total group, 74.3% attended public schools and 25.7% had attended parochial schools. The graduating class rank and SAT median scores of the new entering freshmen was divided in the following manner:

Group	Class Rank	SAT Verbal	SAT Math
1st Quarter	57.4%	588.86	571.89
2nd Quarter	20.7	454.85	455.73
3rd Quarter	7.0	371.25	324.41
4th Quarter	5.0	277.88	312.84
Not available	10.0		

The median high school GPA for the group was 2.99. Only 20% of the group were from graduating classes smaller than 100 in number. The largest number came from senior classes numbering between 300 and 500. Besides the foregoing statistics, the general characteristic of the group was that they were middle class or the close approximation in being lower middle class. The most frequent parental occupational groupings were: civil service, miscellaneous managerial, teachers, civil engineers, skilled mechanics, or laborers.

Fifty-eight students enrolled in the course (HUEC 150) and the majority were freshman students. Freshman in traditional classroom courses were not required to participate in the attitude scale measurement but did so on a voluntary basis. The course was designated as Human Ecology in the listed spring semester course offerings but students registering for the course were also allowed to cross-reference and receive History credit for the course.

During the conduct of the course a student assistant was assigned a specific discussion group comprised of eleven or twelve students and teaching assistants continued through the semester with these same groups. Five primary instructors working with the groups rotated each week to a different group thus averaging three different sessions with each of the five during the semester. The practicum students evaluated those students assigned to their groups on the basis of ability in group discussions. The individual grade sumitted by the practicum student was averaged in as a part of the students' final course grade.

Evaluations were performed and final grades were submitted for the five student assistants working with the primary instructors. These "practicum" students also submitted a critique of the course as a mandatory requirement for them. Throughout the duration of the course, weekly sessions with the practicum students kept all those responsible for instruction abreast of the course development. Requirements were discussed as well as success or lack thereof in focusing on the individual students enrolled in the course.

A brief resume of weekly course work included the following:

Resource Instructors	Subject
Dr. Norton	Course Orientation
Dr. Norton	Problem-Solving: Theory and Methodologies
Sr. Janet Griffin, Ph.D.	The History of the Community
Mr. Seligmann	The Political Community
Dr. Norton	Economics and the Community
Mr. Rhodes	Social Communities
Dr. Arnaud	Education and the Community
Sr. Dorothy Hunter	Geography and the San Antonio Community
Rev. Kippes, Ph.D.	The Religious Community
Sr. Jane Ann Slater, Ph.D.	Bio-Cycles in the Human Environment
Miss Kneip	Public Health and Physical Education
Mr. Tomaino	Welfare and the Community
Dr. Norton	(Audio-Visual Presentations: Environment)
Dr. Norton	Course Critique

(Refer to Appendix D for "Weekly Course Syllabus Samples)

The weekly presentations to the students included several lecturers speaking in their individual area of expertise. Examples of these include: Mr. Alvin Groves "Waterway and Drainage Beautification Projects," Mr. George Ellis "Geology of the San Antonio Area," Mr. Ed Messbarger "Summer Recreational Programs for Teenagers," Mr. Carlos Fryman "Mexican Sports Culture Heritage," and Mr. Delbert Weniger "Primitive Areas and Green Areas."

After the second week of the course, close individual work with the students led them to a selection of a community problem which was to be their primary research topic for the semester. The student was required to follow the steps of the problem-solving methodology (Refer to Appendix E) and submit a paper reflecting his work. To follow the problem-solving steps and to write this presentation posed the greatest difficulty for the students. In order to channel the research requirment away from a routine term paper, each student was required to submit four written interviews with college instructors or community resource persons. The teaching assistants and students often worked quite closely together on both the research and the written presentations.

Problem-solving research projects by individual students included some of the following topics: Fire in San Antonio, Mass Rapid Transit in the Urban Community, Day Care Centers, Drug Abuse in San Antonio, Training of San Antonio Policeman to cope with Public Opinion, Meat Contamination and Transportation, Green acres--A Water Problem, Free School in San Antonio, Increase of Action Participation in City Recreational Summer Programs--12 to 15 Age Bracket, Lack of Resident Participation in Mirasol Homes, Political Participation in San Antonio Community (GGL vs. Independents), The Unwanted Child, Moral Pollution of American Youth, Delinquency as a Family Problem, Birth Control, Society's Treatment of the Mentally ill in State Hospitals, Hemisfair Plaza, Juvenile Shoplifting in the Community, and a New Educational Philosophy for the Mexican-American. Several selections closely approximated the already listed titles, but were variations on these themes. The research paper comprised fifty percent of the student's final grade. The students' work was weighted in the grading process in the following manner: (1) content-50%, (2) adherence to the problem-solving methodology-25%, and (3) style and format -25%.

During the course, students had no primary textbook to follow nor to comfort them. This posed a difficulty for several students. One reason this circumstance existed was due to the lack of any known published material comforming closely enough to the objectives, content, and the structure of the course. This difficulty was overcome by having a large, multiple-copy, reserve section in the library for the course and having the students acquire a few, quite inexpensive paperbacks on special subjects. Those books which the student personally bought included:

DeBell, Garrett (ed). The Environmental Hankbook. New York: Ballantine Books, 1970. 367 pp.

Hockbaum, Gofrey M. Health Behavior. Belmont, Claif.: Wadworth Pub. Co. Inc., 1970. 192pp.

Lernwand, Gerald (ed). The City as a Community. New York: Washington Square Press, 1970. 192pp.

In addition to the above, multiple copies of the following were on special reserve:

Bolin, B., Brown, H. (et al). The Biosphere. San Francisco: W.H. Freeman & Co., 1970. 134 pp. (A Scientific American Book).

Blare, Sheridan, and Rodenbec, John. The House We Live In. New York: Macmillan, 1971. 515 pp.

Council on Environmental Quality. Environmental Quality -- First Annual Report. Wash., D.C.: Gov't Printing Office, 1970. 326 pp.

Detwyler, Thomas R. Man's Impact on Environment. New York: McGraw-Hill, 1971. 731 pp.

Murphy, Earl F. Man and His Environment. New York: Harper & Row, 1971. 168 pp.

The library reserve also included a newspaper clipping file from the three local papers covering a period Jan. 1, 1971 through May 15, 1971. The file was maintained under twelve seperate category headings such as transportation, welfare, pollution, education, etc. Material obtained from various local organizations and governmental organizations was included in the reserve section. This material came from such diverse places as the League for Women Voters, Good Government League, Alamo Area Council of Government, Chamber of Commerce, etc. In addition, many single copies of books applicable to the course were included in the special reserve holdings.

One other very beneficial resource area was audio-visual material incoporated into the course for the students' benefit. Sound filmstrips were secured from the Guidence Associates Company which is an affiliate of Harcourt, Brace & World at Pleasantville, New York. Five programs obtained from this source included the following: "Transportation: Where Do We Go From Here?" "Cities, USA," "The Welfare Dilemma," "Man's Natural Environment: Crisis Through Abuse," and "Environment: Changing Man's Values."

The University of Purdue Master Attitude Scales are obtainable in two forms, A and B, whereby they can be administered as a pre-test and a post-test. Both forms were administered to the freshman students enrolled in the course. A comparative control group was secured on a voluntary basis. The second group was secured from those enrolled in freshman English courses. In many instances, those enrolled in HUEC 150 were

also enrolled in freshman English courses though they did not complete the Master Attitude scales in both instances. It is apparent that use of the Master Attitude scales requiring a better understanding of a profile of the average Our Lady of the Lake College freshman will limit any widespread application of interpretations except upon our own campus.

Another productive area for futher consideration in analysis of the course is provided by student comments on seven questions concerning the course. A sampling of the student comments to questions in edited form included the following:

(1) Have you found the people for your required interviews accessible or inacessible?

1. Accessible ... but not as open as I wished they could have been.
2. Instructors were eager to discover what the student thinks.
3. Cooperative ... appeared to answer questions honestly... interested and helpful in referring one to resource materials and persons.
4. Instructors accessible ... professionals rather difficult to contact.

(2) Would you prefer a single textbook for the course?

1. Textbook ... would seem to defeat the purpose of working with various disciplines.
2. Readings ... more beneficial to an objective view and learning process.
3. Texts tend to restrict information ... get out of date too quickly.
4. Text would not cover everything we covered this year.
5. Readings ... helpful because of the different viewpoints and making you think.

(3) Do you better understand and thus are more capable of using the problem-solving process?

1. Helped me better organize my method of thinking and planning.
2. Pinpointed problem-solving in a very clear way.
3. Wish this class had been available when I was a Freshman.
4. Learning to gather data and research material ... definitely helped me in other courses.
5. Has been a beginning for me ... became aware of what problems are in existence outside my own world.

(4) Do you now have a greater appreciation of the interrelatedness of all academic disciplines?

1. No... only served to enhance this aspect.
2. Now I know who to go to and for what.

(5) Do you now more fully appreciate that there are not single and wholly correct answers to current problems?

1. Course has made me more aware of the problems and the search for answers.
2. Can see the complications in problem-solving in this highly complex age.
3. Never realized that so many answers might be posed for a problem and yet be entirely unworkable.
4. ...see the intermeshing and effects of one decision on another.
5. There was not just one solution or answer... that was was so difficult.

(6) Do you now more fully appreciate the difficulties of those people who are in the community decision-making role?

1. Yes, although I never really thought about this as coming from this course until now.
2. It involves much research and considerable mental powers. Always had, but now even more.
3. Hadn't realized the full extent to which one must go in decision-making.
4. No one single person or organization can solve all the problems.
5. Not realized how extensive and great the problems were that they are making decisions about.
6. A task to come up with solutions... and how they have to tolerate disapproval.

(7) How do you rate this form or method of instruction compared to the traditional classroom?

1. There was a lot of student interrelationship with the professors.
2. Exposed to a variety of views from a variety of experts.
3. Greater freedom for individual learning.
4. Got more out of this class... not simply the material but the method in which it was presented.
5. A less artificial learning environment which stimulates the students.
6. Liked dealing with current community problems and applications of problem-solving to them.
7. More student opportunity to go outside the classroom and trying to understand more about their community.
8. The instruction varied disciplines and methods thus acquainting the student with these divesitites which relates to the multiplicity of real action in a community.

There were minor criticisms of the course but usually they were in a form amenable to small adjustments in course content or methods.

An earnest conviction is that the course, as presented, is capable of meeting several worthwhile objectives or goals. Apparently the students need to understand society and the world in a better fashion and this can be fulfilled through the course. The classroom environment was conducive to a process learning situation as well as incorporating content material in the course. The mode of inquiry, the problem-solving approach, was the focus of the course rather than the subject matter and this is apparently meaningful for many students. Student awareness of process can be achieved and beneficial acquisition stem from such a learning environment. Problem-solving appears to be valuable experience and thus a valuable and beneficial acquisition irrespective of the academic discipline involved. Finally, the problem-solving approach involves the student in inquiry and critical thinking which are the most desirable course objectives. The latter encourages the student to make value judgments relative to current conflicting issues thus negating trends toward scepticism or dogmatism.

IV Results

Item-by-item comparison of the broad area of attitudes toward institutions in comparing pre-test to post-tests revealed:

1) The HUEC 150 group attitude toward religious denominations (churches) rose .78 and the traditional classroom group dropped .31.
2) Attitude toward a capitalistic free enterprise system did not have meaningful shifts occurring for either group.
3) The "American version of democracy" indicated a slight rise for the HUEC 150 group but a .23 drop for the traditional classroom.
4) The authoritarian, male, head-of-household family brought an approximate .50 drop in the HUEC 150 group and no appreciable shift for the comparitive group.
5) The U.S. two political party system recorded drops for both groups but only of the value .48 in HUEC 150 but 1.16 for the comparative group.

The attitude toward any defined group shifted in the following manner:

1) Concerning the legal profession both groups were in near agreement on the post-tests but HUEC 150 arrived there by dropping .50 whereas the traditional classroom was consistent for both pre and post-tests.
2) Toward migrant laborers both groups rose in scale value but the amounts were quite different: HUEC up .94; other group up .65.
3) Similar to the preceeding, labor unions both saw raises but in this instance: HUEC 150 up .78 and other group up .48.
4) Toward Puerto Ricans as a group HUEC 150 rose .74 and the other group dropped .45.
5) American Indians as a category witnessed a .20 rise in HUEC 150 but a drop was registered for the other group of .90.

The results and shifts on attitude toward any school subject revealed:

1) Physical Education and Health found a 1.23 rise in HUEC 150 and a drop for the other group of .16.
2) Biology shifts were: HUEC 150 drop .37; other group drop .72.
3) Rhetoric shifts were drops in both instances but HUEC 150 dropped 1.15 compared to the other groups .19.
4) Drops were recorded for history as a subject: HUEC 150 drop .62; other group drop .11.
5) Government reflected exact opposite trends with HUEC 150 rising .60 and the other group dropping .67.

Vocational attitude changes were exhibited in the following manner:

1) the category Politicians lost equally: HUEC 150 drop was .56 and the other group .77.

2) Civil service as a vocation found a .17 drop for HUEC 150 students and a raise of .33 for the other group.

3) a most dramatic shift was recorded toward the police and in both instances were drops: HUEC 150 drop 1.79 and .63 for the other group.

4) The military suffered the same shift as police: HUEC 150 drop of 1.6 and the other group drop .83.

5) Educator as a vocation saw a .72 drop for the HUEC 150 group and no shift at all for the other group.

The area of attitude toward any Proposed Social Action shifted in the following manner:

1) toward a Guaranteed Annual Income both groups indicated a drop: HUEC 150 dropped 1.2 and the other group dropped 1.08.

2) Legalization of drugs exhibited a very negative attitude prevailing at the onset and saw a mild drop in each instance.

3) Nationalized Health Insurance was looked upon favorably during pre-test but suffered a shift toward the indifference point: HUEC 150 dropped 1.18 and the other group dropped 1.04.

4) Fixed Maximum Population Limit tended toward a level of indifference for both groups but did suffer drops: HUEC 150 dropped .38 and the other group .40.

5) Communal Living Social Groups found an appreciable shift toward the negative: HUEC 150 dropped 1.37 and the other group dropped 1.30.

The shifts referred to above do not give a true picture in merely stating their magnitude. Higher numerical values do indicate favorable attitudes down to the 6.0 indifference point and below that beginning degrees of negative attitude. The preference in some instances though was that the students might reflect a shift toward a negative attitude (e.g. Legalization of Drugs, Communal Living Social Groups). In neither instance could the instructors responsible for the HUEC 150 course see re-enforcement of these attitudes nor shifts to the more favorable as being of assistance in coping with problems related to human ecology.

One handicap for the analyists was the small numerical size of the test groups when the traditional classroom group was made compatable through random selection to the HUEC 150 group size. Under that condition "T" score analysis revealed only five significant changes between the pre-test and post-test for the HUEC group and only two such significant shifts for the other group. Within HUEC 150 group there were found to be statiscally significant shifts in attitudes for the following specific categories: Religious Denomination (churches); Physical Education and Health; Police; Military; Nationalized Health Insurance. Within the traditional classroom group the statistically significant changes were "the U.S. Two Party System" and "Nationalized Health Insurance."

Two interpretations of the results thus far noted are of special significance. The first interpretation is that a single fifteen week semester is much too short a time period to expect statistically significant shifts in attitudes to occur. This is especially true when only 20% of the students' time in that short period is devoted to an innovative, multidisciplinary, problem-solving course. Secondly, the use of master attitude scales for freshman age college students in a fifteen week time span will most probably portray the transitory nature of attitude shifts for that age group. Newspapers, TV, or college lecturers are possible variables which would affect transitory shifts among that age group.

A crucial point relative to the interpretation of any of the master attitude data focuses on the 6.0 indifference value in the weighting and scoring system. Is this the preferred attitude goal to be sought through an educational system? Do we always want the product of our courses and educational system to see both "good" and "bad" about almost all institutions, vocations, school subjects, defined groups and proposed social action? On the other hand is the inculcation of very favorable or very negative attitudes within the student the desired end product? If it is desired that the student look at both sides of an issue, hear all aspects and arguments and only then form his own attitude are we not then encouraging a balance between highly favorable and highly negative and thus the approximation of indifference?

The master attitude scales, of themselves, did not produce clear evidence under the conditions of their administration of the superiority of the multidisciplinary, problem-solving course over the traditional classroom. They would have hopefully substantiated such a conclusion but did not. On the other hand, they did not orient themselves in such a manner that they would specifically provide such a desired conclusion. They have opened up, in the data they did supply, many new vistas, and questions, beyond the normal evaluation system employed for the students in their academic programs. They were a necessary adjunct in trying to evaluate the course itself and not have the success or failure rest only upon letter grades of students and course evaluation sheets. We feel sure that the master attitude scales could have been manipulated to prove the course successful through biased selection of specific columnar headings within the broad attitude areas. This was scrupulously avoided and therefore combining with the limitations of short time span and transitory nature of freshman age level attitudes we did not prove the superiority of HUEC 150 over the traditional classroom though other aspects did so convince us.

V CONCLUSIONS

There are two broad areas of conclusions to take note of in reference to the curriculum research on the course Human Ecology 150. The first of these focuses upon the multidisciplinary nature of the course; the second aspect concerns itself with the problem-solving methodology employed.

Within the first area of consideration several conclusions appear supportable. Freshmen students are unfamiliar with multidisciplinary courses, they prefer to take their chances in adapting to the idiosyncracies of a single instructor, and their previous academic training has empasized the national and international in the social sciences and not the student's immediate community. Freshmen students would benefit more by taking several multidisciplinary courses at the same time rather than one course occassionally scattered among the numerous traditional classroom experiences. There is an upper limit to the number of disciplines that can be brought under the umbrella of a multidisciplinary course. Including too many disciplines brings on a point of diminishing returns in the beneficial aspects of the multidisciplinary approach. Nevertheless, quite broad multidisciplinary approaches do make the student aware of the complexity of today's community problems and the need to acquire a general knowledge base prior to specialization. The faculty involved in a multidisciplinary approach is probably the most important ingredient in the formula for a successful course. The ideal circumstance would be a specific department designated to handle multidisciplinary courses, or in lieu of that, a special staff designated to handle multidisciplinary courses in the broad area of integration (e.g. social/behavioral sciences).

The problem-solving emphasis within a multidisciplinary approach is a particularly effective methodology. Combining several disciplines leaves little time to emphasize content in any particular discipline. Thus the beneficial gain for the student is that he learns a process emphasizing the need and the application of content knowledge in a cross fertilizing multidisciplinary learning situation. Problem-solving is unfamilar to freshman students and a successful experience with it returns increasing dividends to the student as he competes in the other traditional classrooms and continues on with his program of studies. The problem-solving approach involves the students in inquiry and critical thinking thus leading to formulation of value judgments which tends to counteract negativism or dogmatism. A community oriented problem-solving methodology is an effective learning situation well worth the time and effort in the classroom.

The use of Master Attitude Scales as an evaluation device yielded several conclusions. The scales have useful application but not for measurement of shifts in attitude over a short period of time. If attitudes are reflected through values and exhibited through judgments, then ascertaining attitudes and encouraging specific shifts in attitudes can have a meaningful application. In the use of attitude scales it

is just as meaningful to secure shifts toward negative attitudes in specific instances as it is to secure shifts toward favorable attitudes. The use of attitude scales brings to the fore a question of educational philosophy of considerable importance. Is the educated person one who sees both possible good and possible bad in almost all circumstances and thus averages out as an attitude of indifference? The use of attitude scales is conducive to introspection on several basic questions involving the desired end product of the educational system.

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Warmest appreciation is extended to the United States Air Force Officer Training School at Lackland Air Force Base, Texas for assistance and for materials included in these appendices in the subject area - Problem Solving.

ATTITUDE SCALES

Page One (Toward Any Institution)
- Col. 1 Religious Denonimation you are most familiar with, (Churches)
- Col. 2 Capitalistic Free Enterprise System.
- Col. 3 American Version of Democracy.
- Col. 4 Authoritarian, male, head-of-Household Family. (parental control)
- Col. 5 Political Party System (U. S. two party system)

Page Two (Toward Any Defined Group)
- Col. 1 Legal Profession
- Col. 2 Migrant laborers
- Col. 3 Labor Unions
- Col. 4 Puerto Ricans
- Col. 5 American Indians.

Page Three (Toward Any School Subject)
- Col. 1 Physical Education and Health
- Col. 2 Biology
- Col. 3 Rhetoric
- Col. 4 History
- Col. 5 Government

Page Four (Toward Any Vocation)
- Col. 1 Politician
- Col. 2 Civil Service (National, State, Municipal)
- Col. 3 Police
- Col. 4 Military
- Col. 5 Educator

Page Five (Toward Any Propcsed Social Action)
- Col. 1 Guaranteed Annual Income
- Col. 2 Legalization of Drugs
- Col. 3 Nationalized Health Insurance (Gov't)
- Col. 4 Fixed Maximum Population Limit
- Col. 5 Communal Living-Social Groups

A SCALE FOR MEASURING ATTITUDE TOWARD ANY INSTITUTION

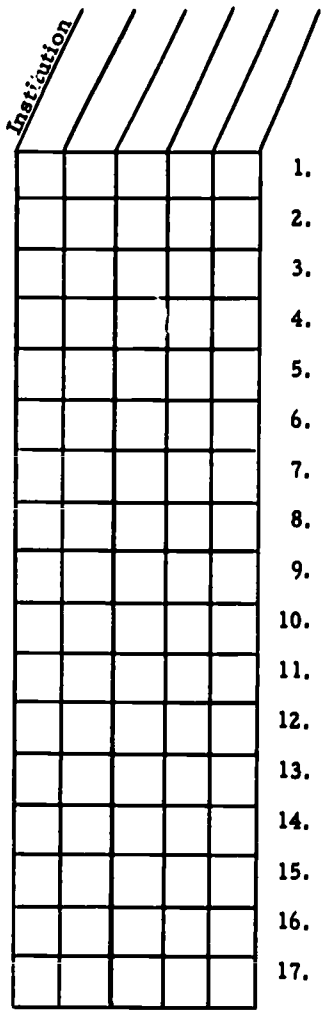
Form B Edited by H. H. Remmers

Date_____

Name (optional)_____ Sex (circle one) M F

Age_____ Grade_____

Directions: Following is a list of statements about institutions. Place a plus sign (+) before each statement with which you agree about the institution or institutions listed at the left of the statements. The person in charge will tell you the institution or institutions to write in at the head of the columns to the left of the statements. Your score will in no way affect your grade in any course.



1. Develops good character.
2. Is retained in the civilized world because of its value to mankind.
3. Is increasing in its value to society.
4. Is necessary as a means of controlling society.
5. Is improving in its service to mankind.
6. Is in the process of changing and will come out a fit instrument.
7. Is not sufficiently appreciated by the general public.
8. Its good and bad points balance each other.
9. Has not yet proved itself indispensable to society.
10. Is too conservative.
11. Is too changeable in its policies.
12. Is unfair to the individual.
13. Is disgraced by its past.
14. Is out of control of society and is running wild.
15. Is an enemy of truth.
16. Is the most despicable of institutions.
17. Is the most hateful of institutions.

A SCALE FOR MEASURING ATTITUDE TOWARD ANY DEFINED GROUP

Form B Edited by H. H. Remmers

Date_____

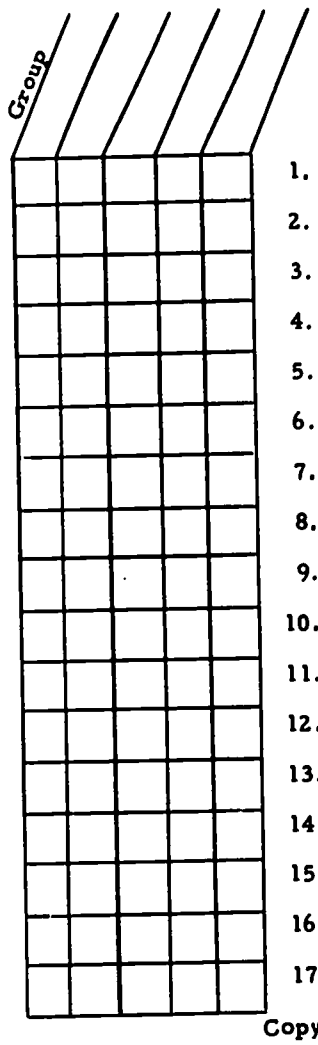
Name (optional)_____ Sex (circle one) M F

Age_____ Grade_____

What occupation would you like best to follow?_____

Your race_____ Your nationality_____

Directions: Following is a list of statements about any group. Place a plus sign (+) before each statement with which you agree with reference to the group listed at the left of the statements. The person in charge will tell you the group to write in at the head of the columns to the left of the statements. Your score will in no way affect your grade in any course.



1. Are honest.
2. Tend to improve any group in which they come in contact.
3. I consider it a privilege to associate with this group.
4. Are on a level with my own group.
5. Are religiously inclined.
6. Are considerate of others.
7. Can be resourceful when necessary.
8. Should be regarded as any other group.
9. Are equal in intelligence to the average group.
10. I have no particular love or hatred for this group.
11. Are of a gregarious nature.
12. I suppose these people are all right but I've never liked them.
13. Have a tendency toward insubordination.
14. Are envious of others.
15. Are discourteous.
16. Are slow and unimaginative.
17. Are the most despicable people in the world.

A SCALE TO MEASURE ATTITUDE TOWARD ANY SCHOOL SUBJECT

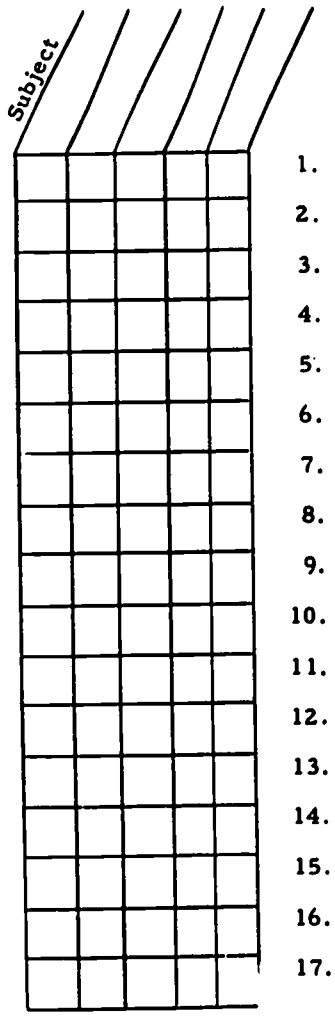
Form A Edited by H. H. Remmers

Date_____

Name (optional)_____ Sex (circle one) M F

Age _____ Grade _____

Directions: Following is a list of statements about school subjects. Put a plus sign (+) before each statement with which you agree about the subjects listed at the left of the statements. The person in charge will tell you the subject or subjects to write in at the head of the columns to the left of the statements. Your score will not affect your grade in any course.



1. No matter what happens, this subject always comes first.
2. This subject has an irresistible attraction for me.
3. This subject is profitable to everybody who takes it.
4. Any student who takes this subject is bound to be benefited.
5. This subject is a good subject.
6. All lessons and all methods used in this subject are clear and definite.
7. I am willing to spend my time studying this subject
8. This subject is a good pastime.
9. I don't believe this subject will do anybody any harm.
10. I haven't any definite like or dislike for this subject.
11. This subject will benefit only the brighter students.
12. My parents never had this subject, so I see no merit in it.
13. I am not interested in this subject.
14. This subject reminds me of Shakespeare's play -- "Much Ado About Nothing."
15. I would not advise anyone to take this subject.
16. This subject is a waste of time.
17. I look forward to this subject with horror.

A SCALE FOR MEASURING ATTITUDES TOWARD ANY VOCATION

Form A Edited by H. H. Remmers

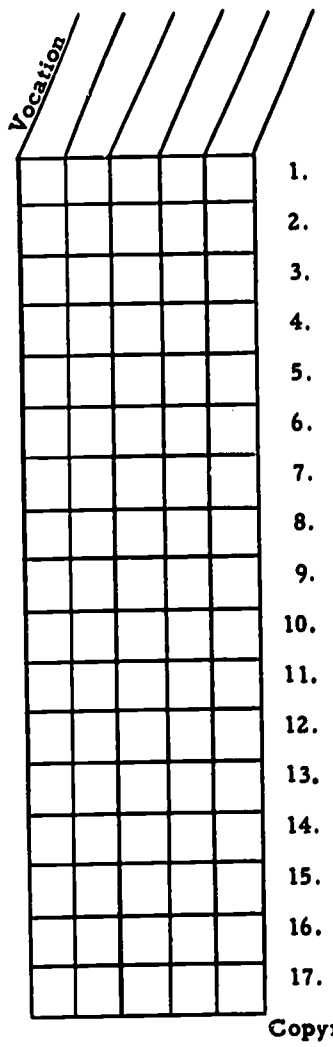
Date_____

Name (optional)_____ Sex (circle one) M F

Age_____ Grade_____

What occupation would you best like to follow?_____

Directions: Following is a list of statements about vocations. Place a plus sign (+) before each statement with which you agree about the vocation or vocations listed at the left of the statements. The person in charge will tell you the vocation or vocations to write in at the head of the columns to the left of the statements. Your score will in no way affect your grade in any course.



1. I love to do this work.
2. I wouldn't mind working seven days a week on this job.
3. This work gives me a great deal of pleasure.
4. This occupation will mean a great deal to me when I am old.
5. This job will bring benefits to everyone who does it.
6. This job is undoubtedly worth having.
7. This vocation is a good pastime.
8. This is a pleasant vocation some of the time.
9. I don't think this work would harm anyone.
10. The advantages and disadvantages of this work about balance each other.
11. This job is all right when no others are available.
12. Many people do not like this work.
13. The advantages of this work will never outweigh the disadvantages.
14. I have no desire to do this kind of work.
15. I would be better off without this job.
16. Only a very stupid person could be satisfied with this work.
17. I have a feeling of hatred for this vocation.

A SCALE FOR MEASURING ATTITUDES TOWARD ANY PROPOSED SOCIAL ACTION

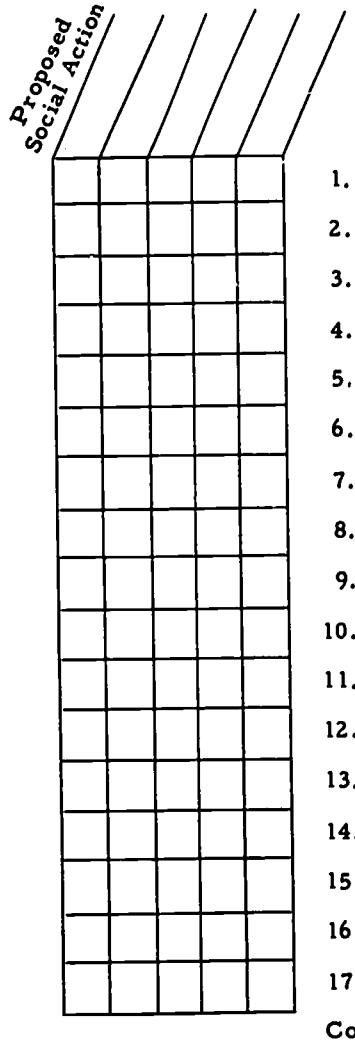
Form A — Edited by H. H. Remmers

Date _____

Name (optional) _____ Sex (circle one) M F

Age _____ Grade _____

Directions: Following is a list of statements about proposed social actions. Place a plus sign (+) before each statement with which you agree with reference to the proposed social action or actions listed at the left of the statements. The person in charge will tell you the proposed social action or actions to write in at the head of the columns to the left of the statements. Your score will in no way affect your grade in any course.



1. Will bring lasting satisfaction.
2. Has unlimited possibilities.
3. Will solve some of humanity's greatest problems.
4. Will be an influence for right living.
5. Is sure to be effective.
6. Is a practical basis for future planning.
7. Places great emphasis upon fair-dealing.
8. Has its merits.
9. Can not do any serious harm.
10. Will be all right in some cases.
11. Cannot meet the demands of a complex social order.
12. Will cause too much friction.
13. Will soon become an object of bitter distrust.
14. Will proceed to injurious limits.
15. Is a disgrace to society.
16. Will destroy our best American institutions.
17. Is perfectly absurd.

A SCALE FOR MEASURING ATTITUDE TOWARD ANY INSTITUTION

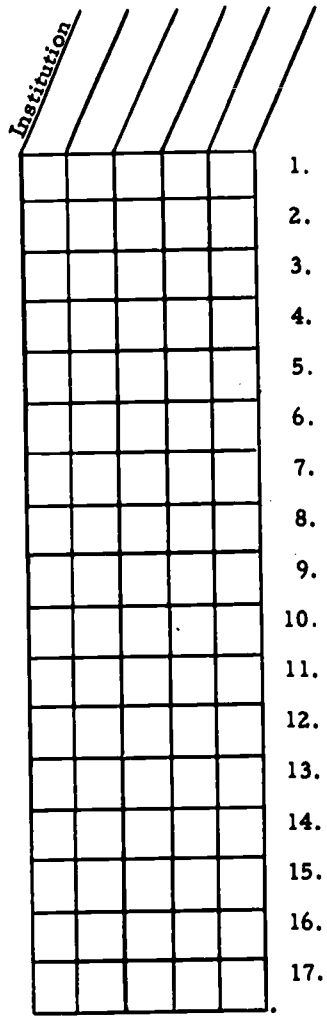
Form A Edited by H. H. Remmers

Date_____

Name (optional)_____ Sex (circle one) M F

Age_____ Grade_____

Directions: Following is a list of statements about institutions. Place a plus sign (+) before each statement with which you agree about the institution or institutions listed at the left of the statements. The person in charge will tell you the institution or institutions to write in at the head of the columns to the left of the statements. Your score will in no way affect your grade in any course.



1. Exerts a strong influence for good government and right living.
2. Serves society as a whole well.
3. Is necessary to society as organized.
4. Adjusts itself to changing conditions.
5. Is improving with the years.
6. Does more good than harm.
7. Will not harm anybody.
8. Inspires no definite likes or dislikes.
9. Is necessary only until a better one can be found.
10. Is too liberal in its policies.
11. Is losing ground as education advances.
12. Promotes false beliefs and much wishful thinking.
13. Does more harm than good.
14. No one any longer has faith in this institution.
15. Is detrimental to society and the individual.
16. Benefits no one.
17. Has positively no value.

A SCALE FOR MEASURING ATTITUDE TOWARD ANY DEFINED GROUP

Form A Edited by H. H. Remmers

Date_____

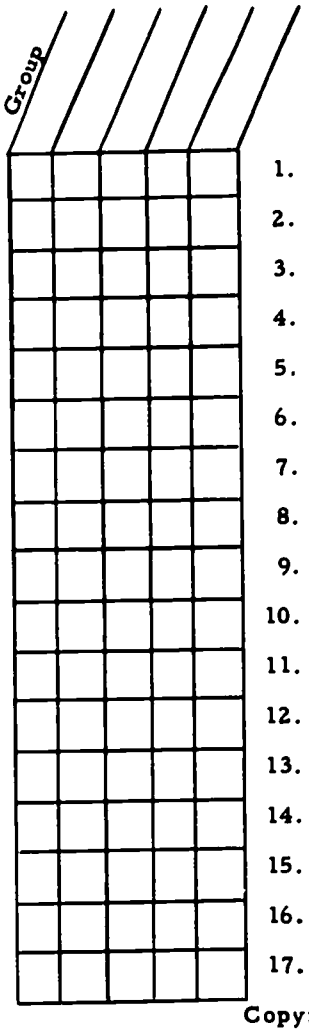
Name (optional)_____ Sex (circle one) M F

Age_____ Grade_____

What occupation would you like best to follow?_____

Your race_____ Your nationality_____

Directions: Following is a list of statements about any group. Place a plus sign (+) before each statement with which you agree with reference to the group listed at the left of the statements. The person in charge will tell you the group to write in at the head of the columns to the left of the statements. Your score will in no way affect your grade in any course.



1. Can be depended upon as being honest.
2. Are far above my own group.
3. Some of our best citizens are descendents from this group.
4. Deserve much consideration from the rest of the world.
5. Command the respect of any group.
6. Are quick to apprehend.
7. Are a God-fearing people.
8. Have an air of dignity about them.
9. Are highly emotional.
10. Take an exceptional pride in themselves.
11. Are superstitious.
12. Are self indulgent.
13. Do not impress me favorably.
14. I am not in sympathy with these people.
15. Would likely prove disloyal to our government.
16. Belong to a low social level.
17. Are mentally defective

A SCALE TO MEASURE ATTITUDE TOWARD ANY SCHOOL SUBJECT

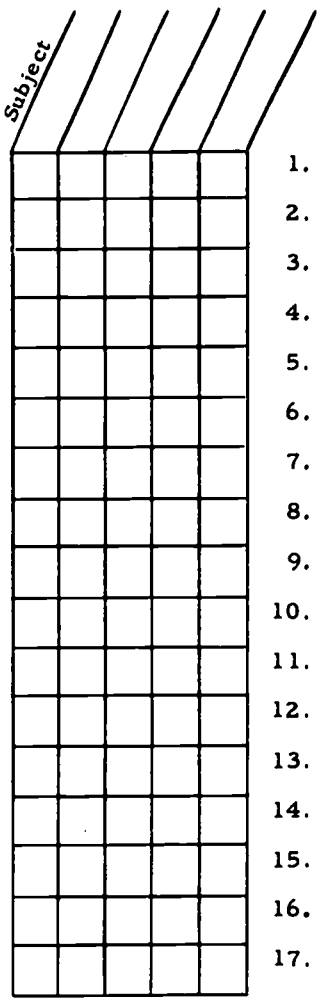
Form B Edited by H. H. Remmers

Date_____

Name (optional) _____ Sex (circle one) M F

Age_____ Grade_____

Directions: Following is a list of statements about school subjects. Put a plus sign (+) before each statement with which you agree about the subjects listed at the left of the statements. The person in charge will tell you the subject or subjects to write at the head of the columns to the left of the statements. Your score will not affect your grade in any course.



1. I am "crazy" about this subject.
2. I believe this subject is the basic one for all high school courses.
3. This subject fascinates me.
4. This subject will help pupils socially as well as intellectually.
5. This subject is interesting.
6. All methods used in this subject have been thoroughly tested in the classroom by experienced teachers.
7. Every year more students are taking this subject.
8. This subject has its drawbacks, but I like it.
9. This subject might be worthwhile if it were taught right.
10. My likes and dislikes for this subject balance one another.
11. This subject is all right, but I would not take any more of it.
12. No student should be concerned with the way this subject is taught.
13. This subject has numerous limitations and defects.
14. This subject seems to be a necessary evil.
15. All of the material in this subject is very uninteresting.
16. This subject has no place in the modern world.
17. This subject is all bunk.

A SCALE FOR MEASURING ATTITUDES TOWARD ANY VOCATION

Form B Edited by H. H. Remmers

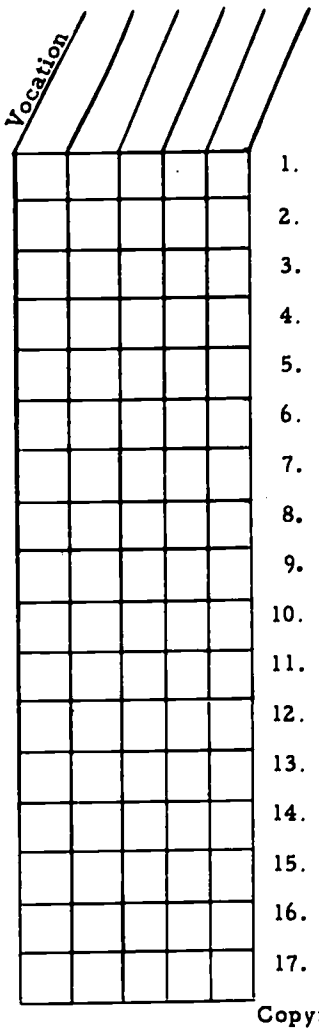
Date_____

Name (optional)_____ Sex (circle one) M F

Age_____ Grade_____

What occupation would you best like to follow?_____

Directions: Following is a list of statements about vocations. Place a plus sign (+) before each statement with which you agree about the vocation or vocations listed at the left of the statements. The person in charge will tell you the vocation or vocations to write in at the head of the columns to the left of the statements. Your score will in no way affect your grade in any course.



1. No matter what happens, this job always comes first.
2. This job is my hobby.
3. I can think of few jobs I would rather have than this one.
4. This work will bring one greater respect from both oneself and others than most other jobs.
5. Everyone should like this vocation.
6. Most people like this kind of work.
7. I can think of a lot more advantages than disadvantages in this work.
8. The advantages of this vocation slightly outweigh the disadvantages.
9. I enjoy only parts of this work.
10. My likes and dislikes for this work about balance one another.
11. There are a few unpleasant things connected with this work.
12. Why should I do this when there are so many more pleasant vocations?
13. I do not care about this job.
14. There are too many undesirable qualities about this occupation.
15. I hate to think of Monday morning coming and having to come back to this job.
16. This work has no place in the modern world.
17. This work is disliked by everyone.

A SCALE FOR MEASURING ATTITUDES TOWARD ANY PROPOSED SOCIAL ACTION

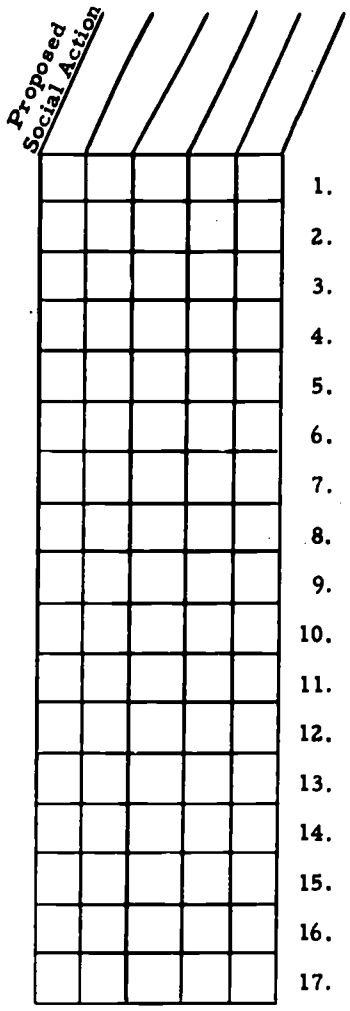
Form B Edited by H. H. Remmers

Date_____

Name (optional)_____ Sex (circle one) M F

Age_____ Grade_____

Directions: Following is a list of statements about proposed social actions. Place a plus sign (+) before each statement with which you agree with reference to the proposed social action or actions listed at the left of the statements. The person in charge will tell you the proposed social action or actions to write in at the head of the columns to the left of the statements. Your score will in no way affect your grade in any course.



1. Is vitally necessary for the welfare of the country.
2. Will advance civilization to a higher level.
3. Will stand the test of time.
4. Shows great possibility of being a success.
5. Will be appreciated by the general public.
6. Shows common sense.
7. Probably will be accepted by the majority.
8. Will be liked only fairly well.
9. Will do just as much harm as it will good.
10. Is too much of a deviation from normal procedure.
11. Is too contradictory.
12. Will not fit into our modern world.
13. Is entirely a haphazard plan.
14. Is a foolish inconsistency.
15. Is an enemy of liberty.
16. Is a ridiculous plan.
17. Can mean only disaster.

SCORING

The median scale value of the statements endorsed is the attitude score. If an odd number of statements is endorsed, the scale value of the middle item of those endorsed gives the score. For example, if three items are endorsed, say, for example items Nos. 2, 3, and 5, the score is the scale value of item No. 3, i.e., 9.2, a highly favorable attitude.

If an even number of items is endorsed, say, for example, items Nos. 1, 2, 3, and 4, the score will be halfway between the scale values for items Nos. 2 and 3 i.e., 9.4. The indifference point on all scales is 6.0, an unfavorable attitude.

This method of scoring, much more rapid and convenient than Thurstone's method (averaging the scale values of the items endorsed) was extensively validated by Sigerfoos.

Note that these scales require no norms beyond the scale values that have been established. The norms are, so to speak, "built in," since what is being measured is the affective value of an attitude object defined by the scale values of the items endorsed by respondents.

Frequency Distribution Tables

Institutions

Column		HUEC 150 (Control Group)										Traditional Classroom									
		Pre-Test					Post-Test					Pre-Test					Post-Test				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
S	10.3			1			2	2	2	1		3	7	4	4	2	1	1	1	1	
C	9.6		2	1		1	5	1	3	5	3	2	6	11	6	10	2		2		
A	9.2	2	2	1	5	1	12	10	5	2	3	10	17	20	19	17	4	4	1	1	
L	8.9	3	6	3	3	3	9	6	7	10	2	27	17	19	21	13	5	3	4	5	2
E	8.5	2	1	5	3	2	5	3	7	1	3	27	14	13	14	10	2	1	2		1
	8.1	5	1	1		3	4	1	2	4	5	20	8	10	12	10	2		2	4	1
V	7.7	3	1	1	3	3	1	6	7	3	9	7	2	9	6	5		3	4	2	1
A	6.5	1		1	2			5	4	4	8	3	5	3	7	7	1	4	2		6
L	6.0	2				2	2	5	1	5	5	5	4	3	3	11	1			4	4
U	5.5			2	1	1	1	2	3	3	3	2	1	5	3	9	1	2	1	3	
E	4.7		2	1		1	1	1	1	1	1		5	2	3	1					2
	3.6					1	2	2	1	1		1	3	2		7	1	2	1		1
	3.1			1		1						1	4	1	4	2	1				1
	2.6												3		1						
	2.2												1								
	1.6		1										2								
	1.0												1								

Frequency Distribution (Cont.)

Defined Groups

Column		HUEC 150 (Control Group) Pre-Test					HUEC 150 (Control Group) Post-Test					Traditional Classroom Pre-Test					Traditional Classroom Post-Test				
S	10.3							1	2			4		2	1			1	1		
C	9.6	1					3		1			3	1	1	1	2	3				
A	9.2	1					3			3		16	5	2	7	3	1			1	2
L	8.9	5	4	1		1	2	2	1	2	1	16	8	6	2	12	1	1		1	
E	8.5	3	1	2	2	3	3	9	2	6	5	15	16	11	12	17	1	2	1	2	
	8.1	3		3	3	3	5	2	3	2	3	16	11	10	10	16	1	1	1	1	2
V	7.7	1	2	1	2	1	10	7	9	11	8	4	13	10	13	16	5	2	5	5	3
A	6.5	1	3	1	3	6	6	8	7	7	11	12	13	7	13	15	4	6	4	2	7
L	6.0	2	1	3	2	2	6	9	7	3	6	9	9	8	6	6	1	5	3	1	2
U	5.5		3	2	2	2	3	4	4	5	2	6	7	7	14	10	2	2	4	3	2
E	4.7		2		2		1		2		1	1	5	2	4	2	1				
	3.6			2	1			1	3	1		2	4	6	4	3			1	1	
	3.1	1	1	2					1	1	1	2	5	14	6					1	1
	2.6			1						1			3	6						1	
	2.2												1	1		1					
	1.6		1		1					1			3		2					1	
	1.0						1														

Frequency Distribution (Cont.)

School Subjects

Column		HUEC 150 (Control Group) Pre-Test					HUEC 150 (Control Group) Post-Test					Traditional Classroom Pre-Test					Traditional Classroom Post-Test				
S	10.3			1								2	1	2	1				1		
C	9.6	2	1	2	1	1	1				1	4	5	6	3	3	1				
A	9.2		1	2	4	5	2	1			2	10	18	9	11	19	1		1		1
L	8.9		1	6	5	2	2	5			8	10	17	17	23	15	1	4	2	3	1
E	8.5	1	1	1	3	1	6	6		2	9	10	15	14	13	18	5	2	3	4	4
	8.1	1	4				10	6	4	2	4	14	7	8	8	7	4	3	3	4	2
V	7.7	2	2	1	2	2	9	3	4	3	2	3	8	9	8	7	2	1	3	1	5
A	6.5	3		2	1		4		4	2	2	19	9	8	12	10	2		3	4	
L	6.0	1	3	2		5	5	8	2	3	4	8	8	8	5	11	1	4		1	1
U	5.5	5	1		1	1		1	4	5	3	10	9	5	10	10		1	3	1	1
E	4.7	1	1	2	1	1	2	3	8	6	1	4	4	13	5	3	1	2		3	2
	3.6		1		1			1	9	5		4	3	1	3	3		1	1		1
	3.1		2					5	1	6	1	4	4	3	2	1		1			1
	2.6	2	1				1	3	5	7		3	3			2	1	2			
	2.2					1	1	1	1	3	2	1		1		1	1		1		
	1.6														2						
	1.0																				

Frequency Distribution (Cont.)

Vocations

Column		HUEC 150 (Control Group) Pre-Test					HUEC 150 (Control Group) Post-Test					Traditional Classroom Pre-Test					Traditional Classroom Post-Test				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
S	10.3					1					1			2		3					
A	9.6		1			1		1			1		2		1	2		1			1
L	9.2	1	3	2	1		2	1			2	1	4	5	2	12	1	1			1
E	8.9	1		2	2	1	4				10	3	5	9	6	17	1	2			4
	8.5	1		1	1	5		5		2	10	4	5	2	5	16		3		2	5
V	8.1	2	4			5	1	5	2	2	6	5	29	3	2	20		1	3		1
A	7.7	1	4	2	1	3	2	9	4	3	2	2	16	9	7	14		3	1		2
L	6.5	1	1	3	1	1	3	4	4	2	1	9	13	10	10	6	1	2	2	2	1
U	6.0	2	2	2			3	5	2	3	4	8	12	11	5	6		2		1	3
E	5.5	2	1	4	4		5	3	4	5	3	13	10	10	15	2	2		1	4	2
	4.7		1	3	1		5	4	8	6		16	4	18	13	4	1		5	1	
	3.6	3	1		3		5	1	9	5		18	5	9	12	1	4		5	3	
	3.1	2			1		6		1	6	1	14	2	7	13	3	3		1	4	
	2.6	2		1	1		7		5	7		10	2	5	5		4		1	2	
	2.2						2		3	2			1	1	1		2		2	1	
	1.6											1			1		2		2	1	
	1.0														1						

Frequency Distribution (Cont.)

Proposed Social Action

Column		HUEC 150 (Control Group)										Traditional Classroom									
		Pre-Test					Post-Test					Pre-Test					Post-Test				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
S	10.3	1		1			1					3		5		3					
C	9.6					2	1					6		1	4	4	1				
A	9.2	1		1		1	1		2	2	2	10	3	5	5	10	1		2	1	3
L	8.9	6		2	2	5	3		3	4	3	7	3	19	11	11	2		3	1	2
E	8.5	2		9	3		5		6	5	2	20	2	24	10	7	1			2	
	8.1	4		3	4		3		10	4	2	10	5	18	13	4	1		3	1	
V	7.7	1	2	2	1	1	8	2	6	3	3	7	1	11	7	5	3	2	2	1	1
A	6.5	2	1		1	3	3	3	4		3	9	4	4	6	11	1	1	4	1	1
L	6.0		1	1	1	3	4	1	6	6	4	5	8	4	10	8	2	1	3	2	2
U	5.5				2	1	1	4	1	3	4	5	8	3	7	9	1	1	1	2	1
E	4.7		1		1	1	5	4	3	1	4	1	7	2	3	5	4	2	2	1	1
	3.6	2	1			1	2	6	1	7	6	5	10	3	7	9	1	2		5	4
	3.1		5		2	1	2	3	1	6	5	4	20		7	12		2		1	2
	2.6		4		1			15		1	4		20		7	1		5		1	2
	2.2		2		1		1	4		1	1		7		5	4	1	3		1	1
	1.6							1		1		2	5	3	1			1		1	
	1.0		1				1	2			1		3					1			1

Master Attitude Scales
Ranges and Medians: HUEC 150 (Control Group)

	Col 1		Col 2		Col 3		Col 4		Col 5	
	(R)	(M)	(R)	(M)	(R)	(M)	(R)	(M)	(R)	(M)
Pre-Test	9.2	8.1	9.6	8.9	10.3	8.5	9.2	8.7	9.6	8.0
	6.0		1.6		3.1		5.5		3.6	
Institutions										
Post-Test	10.3	8.6	10.3	8.0	10.3	8.5	10.3	8.3	9.6	7.5
	3.1		3.6		3.6		3.6		4.7	
Pre-Test	9.6	8.6	8.9	6.5	8.9	6.0	8.5	6.4	8.1	6.6
	3.1		1.6		2.6		1.6		5.5	
Defined Groups										
Post-Test	9.6	7.7	10.3	6.4	10.3	6.5	9.2	7.6	8.9	6.4
	4.7		3.6		3.1		1.6		1.0	
Pre-Test	9.6	6.4	9.6	7.5	10.3	8.8	9.6	8.9	9.6	7.9
	2.6		2.6		4.7		3.6		2.2	
School Subject										
Post-Test	9.6	8.0	9.2	5.9	8.1	4.8	8.5	4.8	9.6	8.6
	2.2		2.2		2.2		2.2		3.1	
Pre-Test	9.2	5.7	9.6	7.9	9.2	6.0	9.2	5.5	10.3	8.3
	2.6		3.6		2.6		2.6		6.5	
Vocation										
Post-Test	9.2	4.8	9.6	7.8	8.1	4.7	8.5	4.5	10.3	8.5
	2.2		3.6		2.2		2.2		3.1	
Pre-Test	10.3	8.4	7.7	2.8	10.3	8.4	8.9	7.7	9.6	7.5
	3.6		1.0		6.0		2.2		3.1	
Proposed Social Action										
Post-Test	10.3	7.6	7.7	2.7	9.2	7.7	9.2	6.1	9.2	5.6
	1.0		1.0		3.1		1.6		1.0	

Master Attitude Scales (Cont.)
Traditional Classroom (Comparative Group)

	Col 1		Col 2		Col 3		Col 4		Col 5	
	(R)	(M)	(R)	(M)	(R)	(M)	(R)	(M)	(R)	(M)
Pre-Test	10.3	8.5	10.3	8.6	10.3	8.7	10.3	8.9	10.3	8.6
	3.1		1.0		3.1		2.6		3.1	
Institutions										
Post-Test	10.3	8.7	10.3	7.1	10.3	8.3	10.3	8.3	8.9	7.1
	3.1		3.6		3.6		5.5		3.1	
Pre-Test	10.3	8.3	9.6	7.7	10.3	6.2	10.3	6.6	9.6	7.6
	3.1		1.6		2.2		1.6		1.6	
Defined Groups										
Post-Test	9.6	9.0	10.3	615	10.3	7.0	9.2	7.1	9.2	615
	4.7		5.5		3.6		1.6		1.0	
Pre-Test	10.3	7.8	10.3	8.0	10.3	8.2	10.3	8.0	9.6	8.3
	2.2		1.0		2.2		1.6		2.2	
School Subject										
Post-Test	9.6	8.0	8.9	6.3	10.3	8.0	8.9	7.8	9.2	7.4
	2.2		4.7		2.2		2.2		5.5	
Pre-Test	10.3	8.2	9.2	3.2	10.3	8.4	9.6	7.6	10.3	7.8
	1.6		1.0		1.6		1.6		2.2	
Proposed Social Action										
Post-Test	9.6	6.4	7.7	3.2	9.2	7.2	9.2	5.1	9.2	4.1
	2.2		1.0		4.7		1.6		1.0	

		Col. #1	Col. #2	Col. #3	Col. #4	Col. #5
TRADITIONAL CLASS	Institutions	8.3175 1.0544 54	7.2330 2.6329 50	8.1901 1.6188 51	7.7735 1.6696 51	7.4764 2.0343 51
	Defined Groups	7.3760 1.7161 25	6.2538 1.9075 26	6.2065 2.4417 23	6.7891 1.9121 23	7.3420 1.4835 25
	School Subjects	7.2519 2.2626 26	7.0846 2.2113 26	7.3807 2.1619 26	7.2769 1.4245 26	7.6038 1.6870 26
	Vocation	4.8730 1.7451 26	6.7600 1.8391 25	5.7153 2.0192 26	5.4240 2.0958 25	7.7326 1.3981 26
	Proposed Social Action	7.5730 1.7746 26	3.8750 1.9356 26	8.1326 1.3648 26	5.7019 2.4767 26	6.5040 2.4771 25
HUEC 150	Institutions	7.9111 0.9789 18	7.8343 2.2314 16	7.7111 1.8695 18	8.1882 1.1288 17	7.4833 1.6171 18
	Defined Groups	7.8583 1.5139 18	6.3611 2.0571 18	6.0416 2.1187 18	6.2138 1.8273 18	7.0722 1.8290 18
	School Subjects	6.2722 1.9372 18	6.4315 2.1620 19	7.9210 1.6435 19	7.9421 1.5527 19	7.2730 2.0032 19
	Vocations	5.6194 2.2503 18	7.1944 1.6196 18	6.2111 1.6533 18	5.7088 2.1157 17	8.3440 0.7934 18
	Proposed Social Action	7.8473 1.7243 19	3.6833 1.8918 18	8.3368 0.7824 19	6.3815 2.2705 19	7.0157 2.0194 19

TRADITIONAL CLASS		Col. #1	Col. #2	Col.#3	Col.#4	Col.#5
	Institutions	8.0023 1.9185 21	7.4375 1.8374 20	7.9600 1.5100 20	7.5710 1.4837 19	6.3157 1.5474 19
	Defined Groups	7.3750 1.4201 20	6.9050 1.2693 20	6.6800 1.3961 20	6.3375 2.1565 20	6.4550 1.8433 20
	School Subjects	7.0976 2.0404 21	6.3666 1.2693 21	7.1952 1.3961 21	7.1666 1.4823 21	6.9300 1.8325 20
	Vocation	4.0894 2.0415 19	7.1950 1.4841 20	4.7976 1.8761 21	4.5975 1.8535 20	7.7275 1.3395 20
	Proposed Social Action	6.4921 2.0466 19	3.6904 1.9113 21	7.0925 1.4398 20	5.3095 2.3294 21	5.2047 2.6429 21
	**********	**********	**********	**********	**********	**********
HUNDRED AND FIFTY	Institutions	8.6954 0.9244 22	7.4386 1.7879 22	7.8095 1.5687 21	7.9650 1.7625 20	7.0000 1.7379 21
	Defined Groups	7.3285 1.4196 21	7.4619 1.2556 21	6.8261 1.9502 21	6.9547 1.4651 21	7.2738 1.0146 21
	School Subjects	7.5000 2.3389 22	6.0659 1.3558 22	6.7681 1.8270 22	7.3250 1.3511 22	7.8734 1.7336 21
	Vocation	5.0523 2.3389 21	7.0238 1.3558 21	4.4261 1.8270 21	4.1090 1.3511 22	7.6193 1.7336 23
	Porposed Social Action	6.6404 2.2958 21	3.3934 1.4363 23	7.1595 1.5165 21	6.0090 2.4461 22	5.6431 2.3738 22

POST-TEST

HUEC 150 POST TEST

t=score
df=degree of freedom

PRETEST HUEC 150		Col. #1	Col. #2	Col. #3	Col. #4	Col. #5
	Institution	-2.5357 38 at 2%	0.5902 35	-0.1741 37	0.4374 35	0.8712 37
	Defined Groups	1.0982 37	-1.9952 37	-1.1726 37	-1.3689 37	-0.4222 37
	School Subjects	-2.2003 38 at 5%	0.4988 39	1.7756 39	1.0295 39	-1.1539 38
	Vocation	0.7485 37	0.3489 37	3.0962 37 at 1%	2.7963 37 at 1%	1.6935 39
	Proposed Social Action	1.8178 38	0.5441 39	2.9625 38 at 1%	0.4905 39	1.9294 39
	CONTROL POST TEST					
PRETEST TRADITIONAL CLASS	Institutions	0.8941 73	-0.2879 68	0.5414 69	0.4582 69	2.2244 68
	Defined Groups	0.0020 43	-1.2889 44	-0.7476 41	0.7110 41	1.7488 43
	School Subjects	0.2377 45	1.0968 45	0.3050 45	0.2537 45	1.2646 44
	Vocation	1.3538 43	-0.8386 43	1.5652 45	1.0358 44	0.0122 44
	Proposed Social Action	1.8495 43	0.2300 45	2.4484 44 at 2%	0.5429 45	1.6810 44

45

TRADITIONAL CLASSROOM POST TEST

t= score
df= degree of freedom

POST TEST HUEC 150

	Col. #1	Col. #2	Col. #3	Col. #4	Col. #5
Institutions	1.4851	0.0193	-0.3050	0.7339	1.2771
	41	40	39	37	38
Defined Groups	-0.1022	1.3777	0.2679	1.0501	1.7299
	39	38	39	39	39
School Subjects	0.7217	-0.4236	-0.6531	0.2839	1.9454
	39	39	39	39	39
Vocation	1.3461	-0.3765	-0.6346	-1.1354	-0.2208
	39	39	40	40	41
Proposed Social Action	0.2094	-0.5726	0.1413	0.9375	0.5590
	38	42	39	41	41

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

TRADITIONAL CLASSROOM PRE TEST

PRE TEST HUEC 150

Institutions	-1.4228	0.8112	-1.0206	0.9403	0.0125
	70	64	67	66	67
Defined Groups	0.9325	0.1735	-0.2217	-0.9510	-0.5203
	41	43	39	39	41
School Subjects	-1.4622	-0.9662	0.8935	1.4138	-0.5900
	42	44	43	43	43
Vocation	1.2091	0.7842	0.8413	0.4203	1.6400
	42	42	42	40	42
Proposed Social Action	0.5069	-0.3185	0.5731	0.9208	0.7172
	43	43	43	43	42

HUEC 150 SPRING 1970 PRE TEST

HUEC 150 FALL 1971 PRE TEST

	Col. #1	Col. #2	Col. #3	Col. #4	Col. #5
Institutions	0.5825	0.4418	0.8574	0.6440	0.7416
	35	31	35	34	34
Defined Groups	0.5398	0.6509	0.3221	0.4769	-1.2553
	33	33	33	32	33
School Subjects	0.1330	0.0884	0.5512	0.6884	-0.5833
	35	36	37	37	36
Vocation	-0.8536	-1.4284	0.1568	-0.7752	0.3499
	34	34	34	33	35
Proposed Social Action	0.1162	-1.7233	0.4152	-1.2750	0.1733
	36	35	36	35	36

Human Ecology 150 (Wk 1)

Theme: Introduction

Course Description: The week will be expended in assuring that the students know what this new course, its objectives, and the methods of approach are. On Monday they will receive a lecture by the project director explaining the requirements for the course, resource center, teaching assistants, the weekly schedule, etc. At 8:30 a.m. the primary instructors will be introduced to the students and the remaining twenty minutes by a panel discussion or question and answer with the five primary members in front of the large group. Wednesday schedule will be small group discussions but the student will be required to have two hours preparation from bibliography at the end of this paper. Discussion can orient itself around any part of bibliographic material or instructor is free to present his interpretation of the course.

Objectives:

1. Assure that the student knows the intent and requirements of the course.
2. Assure that the student understands the methodology of the course (i.e. multi-disciplinary, problem-solving).
3. Acquaint the student with the weekly schedule, resources center and teaching assistants.

Achieving Objectives:

The Monday session is explained in the course description. The Wednesday session will be small group discussions with one primary instructor and a student assistant present. If discussion moves freely the instructor only need assume role of a moderator; if it does not, he must query closely to ascertain that the students know what the course is about. Friday, the student will be required to spend time in the resources center and to have accomplished a total of sixty pages of reading for the week.

Evaluation:

Students will accomplish a 15 min. quiz on Friday over reading material they are responsible for to this point.

Bibliography:

Council on Environmental Quality, Environmental Quality: 1st Annual Report. Wash., D.C.: GPO, 1970. pp. VIII-IX, XI-XV, 5-18, 221-241.

Arensberg, C.M. and Kimbal, S.T. Culture and Community. New York: Harcourt, Brace, 1965, pp. 97-210.

De Bell, Garrett (ed) The Environmental Handbook. New York: Ballatine Books, Inc. 1970, pp. 129-133.

Bruner, Jerome (ed) Learning About Learning. Wash. D.C. : HEW/USGPO. 1966. pp. 93-104.

Human Ecology 150 (wk 11)

Theme: Problem Solving

Course Description: Problem-solving is not a clearly defined art nor is it a specific organizational methodology. In fact no clear distinction has yet been made differentiating problem-solving from the process of learning itself. It is necessary during this week, though, to indicate to the student that an activist and positivist approach can be adopted in attempting to cope with today's world. Negativism and "hand wringing" are not contributive to leading us out of the jungle. This week will be the most challenging to the instructors and they will need to do their homework in the bibliographic material quite carefully. The Monday large session will consist of a panel discussion plus questions and answers by students. Wednesday, the primary instructors and teaching assistants will work with activity and as many as possible individual conferences with students. Have students elect very general areas for their individual projects.

Objectives:

1. Acquaint students with existing literature on problem-solving.
2. Student know as many problem-solving methods as possible (PERT, Brainstorming, direct application, dialectic method, etc.)
3. Student participate in a "lab" problem-solving experience.

Achieving Objectives:

Monday's panel discussion will consist of an educational psychologist, Representative from Lackland Air Force Base OTS program, a mathematician, Irving Seligmann, Father Lonergan and the HUEC 150 project director. The students will be required to participate in a "lab" problem-solving experience at their Wednesday small group meeting. The primary instructor is free to set up his own problem-solving situation and problem model for evaluating student results. If discussion interferes with an effective "lab" problem-solving session then such an exercise could possibly be held over till Friday. If Wednesday "lab" was quite successful then Friday could be utilized for a second "lab" but using a different problem-solving approach. From an announcement made by the project director on Monday, students will have signed up for individual conferences on Friday.

Evaluating Objectives: The student must complete a written description of his thought processes during the "lab" exercise. The Student Time accountability form for required reading accomplishments will be checked.

Bibliography:

Bloom, Benjamin S. Taxonomy of Educational Objectives: Handbook 1. New York: David McKay Co., Inc., 1969. pp. 120-123.

Kaufman, Arnold. The Science of Decision Making. New York: McGraw-Hill, 1968. pp. 9-37.

Kleinmutz, Benjamin (ed). Problem-Solving: Research, Method, and Theory. New York: Wiley and Sons, 1966. pp. 128-148, 225-257.

Polya, George. Mathematical Discovery. New York: Wiley & Sons, 1962. pp. 117-123.

Lackland OTS Center, Air Force Leadership. Lithouia, Ga.: McDaniel Printing Co., 1968. pp. pp. 2-33 thru 2-43.

Air University, Creative Problem Solving and Solution Reporting. Maxwell AFB; Ala.: Air University, 1968. pp. 1-38.

Human Ecology 150 (Week 111)

Theme: The City In History

Course Description: The activities of this week are based on a combination of problem solving and the acquisition of factual knowledge. An illustration of the problem solving technique of a historian will be applied to a basic problem - - urban growth. Besides the knowledge ascertained in this manner, the students will also learn of the important role cities have played in the past, and will become familiar with the founding and development of Fiesta Week and Hemisfair.

Objectives:

1. Given a list of feasible explanations, the student will learn that urban growth is caused by a series of events rather than just by a single force.
2. Given the facts accompaning the founding of Fiesta Week and the establishment of Hemisfair, the student will have a working knowledge of these two events peculiar to San Antonio.
3. Given the role the city has played in history, the student will achieve a greater insight into a city's importance in both European and American History.
4. As a result of the activities described below, the students will learn the solving problem technique peculiar to the discipline of history (i.e. information on authors)

Achieving Objectives:

As an assignment from the previous Friday, the class will have listened to a tape in the resource center which gives an account of the important role cities have played in America's past. On Monday, they will read newspaper and journal articles on the usual problems which have been classified as "urban crises." Then, they will have a study sheet based on the reading of the Introductory chapter of Banfield, The Unheavenly City. By this, means, they will figure out the reasons for the obvious conflict between Banfield and the other authors. The students will discover the differences in definition, criteria, and the selectivity, which Banfield employs in contrast to the other authors. On Wednesday, there will be lecture which seeks to give them the necessary tools so that they may decide who is the "correct author" from Monday's readings. The students will follow the procedure of getting facts, finding causes, evaluating these, and arriving at valid conclusions. If time permits, there may be a 15 minute lecture by Sr. Frances Jerome on the culture of class and race in ausing urban growth. As any assignment, they will list possible factore which might influence authors then they will be given a list of authors and will have to find material on these men in the various sources in the library

which give information on American authors. Before looking up information on each individual, excerpts will be given and the student will attempt to project a bias of a particular author from the sample of his writing furnished to the student. On Friday, the class will meet for small group discussion; during this time, they will discuss samples of historical writing, some of which is very poor and some very good. They will also try to evaluate critically solutions offered by various authors to solve the urban crises. For additional work, they will do the programmed learning on Fiesta Week and Hemisfair; will listen to a tape by Mr. and Mrs. Andriks about Fiesta, or play the simulation game of Ghetto, if applicable. Could have accomplished this as well as the objective test any time during the week.

Evaluation:

Give them on Monday a final test on concepts and facts that they should learn this week. The test will be administered by the student assistants on any day a particular student might request. On Friday, an evaluation of historical writings will also be graded. For an "A", students can research a certain topic such as the repercussions of the FHA and other similar topics. (This can be done any time during the week). In the long run, the primary instructors could require each of their students to obtain information on the authors of the books they are using in their long-term project.

Bibliography:

DeBell, Garrett. The Environmental Handbook. New York: Ballantine Books Inc., 1970, pp. 12-26.

Mumford, Lewis. The City in History. New York: Harcourt, Brace & World, 1961. pp. 482-499, 514-576.

Glaab, Chas. N. The American City: A Documentary History Homewood, 111: Dorsey Press, 1963, pp. 461-473, 450-460.

Banfield, Edward C. The Unheavenly City. Boston: Little, Brown and Co., 1970. pp. 3-44.

Individual Dynamics-The Problem-Solving Process

INTRODUCTION

All persons in positions of authority make decisions daily. Indeed, making decisions is their principal business, and the soundness of their judgment largely determines the success of the enterprise entrusted to them. No place is this more true than for those people whose responsibility for managing personnel and for the judicious use of material, time, and money requires the constant exercise of judgment. Fortunately, a good many decisions can be made quickly by rule of thumb. One identifies the situation and immediately applies to it a principle or plan of action known to be effective in the circumstances. But, situations of this kind hardly present a "problem," as we shall use the term in this course.

By a problem, we shall mean a situation calling for decision in which the action to be taken cannot be determined by rule of thumb. The situation is entirely new, or contains unfamilar elements, and no known solution is available. Here, a wise decision may call for creative thinking and judgment of a high order. In today's complex society we encounter problems more often. The conditions of modern society are changing so rapidly that the decision maker must often cope with problems that require ingenuity as well as judgment. An individuals value to society depends on his ability to solve such problems.

While problem solving requires native insight and soundness of judgment, it requires also a sense of method to insure that the problem is thoroughly understood and that no consideration essential to its solution is overlooked. Consider the following five steps as a method in solving the problem:

Recognize the problem.
Gather data.
List possible solutions.
Test possible solutions.
Select final solutions.

It is perhaps a little misleading to refer to the suggestions above as "steps." This seems to imply that they must be followed in a particular order and that the problem solver must complete each before proceeding to the next. We will sometimes do well to vary the order and also, after completing one step, it may be wise to go back and reconsider an earlier one. Thus, we may sometimes need to gather data before analyzing the problem or, after gathering data, it may be necessary to reconsider the analysis of the problem. But, usually, the order indicated above will be useful.

Five-Step Method of Problem Solving

In the following pages we shall consider each step in detail.

STEP 1 - Recognize the Problem.

We cannot hope to solve a problem until we have the problem squarely before us. This may seem obvious. In practice it is less obvious than it sounds. We may not be clearly aware that a problem actually confronts us, or we may be uncertain whether it is a prlblem for us or for someone else to solve. In addition, we may not know exactly what the problem is. In clarifying these matters, it will help to raise three questions:

DOES THE SITUATION PRESENT A PROBLEM? A principal difference between two persons in a position of responsibility is that one is more sensitive than the other to problem situations. One man works in an office for months without seeing anything amiss. Another has not been on the job a day before he senses that something is wrong. In many job positions this difference is important for it is the business of responsible poeple to detect problems as well as to solve them.

TO WHOM IS THE PROBLEM PRESENTED? A problem may exist, but whose problem is it? We should be clear on this point lest we pass the buck when we act or meddle in what does not concern us. When confronted by a problem situation, our first question should be: "Is this a problem I should do something about?"

EXACTLY WHAT IS THE PROBLEM? One may be aware that a problem situation exists without knowing exactly what the problem is. The more sharply and narrowly we can define the problem, the better. A workman is given the task of counting accurately several thousand coal buckets stacked in a large warehouse area. Learning that there are exactly 24 buckets in each stack, he at once narrows the problem to the question: "How can I count the number of stacks?" One should narrow the problem as sharply as possible, taking care, however, not to eliminate part of it, and then should state the problem interrogatively: "How can I get an aerial view of the stacks of coal buckets?"

STEP 2 - Gather Data

The solution of a problem often requires the collection of more information than is already at hand; indeed, in some cases, it may require elaborate research. The data collected consists usually of facts, sometimes also of the opinions of experts when questions arise. We shall consider them briefly:

WHAT DATA WILL BE NEEDED? This question may be difficult to answer in advance. Ocassionally it will be clear from the location and analysis of the problem that certain information will be needed. In other cases, one can know only in a general way what data he will need

and will sometimes collect more material than he finally uses.

WHERE CAN THE DATA BE OBTAINED? There are so many possible sources of data that it is impossible to suggest more than a few of them here. Any public or university library contains information likely to be useful on many problems. Much printed and typed material (communications, directives, reports, etc.) is available through government agencies or research institutions. Facts and the opinions of experts may be collected by interview or by asking persons to fill out questionnaires. Personal observation will often provide information not otherwise available. While it is well in each case to consider carefully what are the most likely sources of information, it is impossible to offer advice on the subject that would be useful in all cases.

HOW RELIABLE ARE THE DATA? The reliability of the facts reported in publishes research can be gauged by the reputation of the author as a professional student in his field and by the standing of the journals in which he publishes. When facts are reported orally by ordinary witnesses, we may accept their testimony. We readily accept their testimony when several independent witnesses' testimony is also acceptable if they have had an opportunity to observe the facts, if they have a reputation for veracity, and if they seem free from bias. Of experts, giving their personal opinion on a controversial issue, we expect more. We wish to know whether the expert has the professional training to interpret the facts as well as whether he had an opportunity to observe and is free from bias.

Before attempting to solve a problem it usually is wise to raise three questions about the problem itself and the conditions under which it must be solved:

ON WHAT ASSUMPTION MUST THE PROBLEM BE SOLVED? Often the answer to this question is "none." But, occasionally, it is impossible to avoid making assumptions; that is, taking as true what cannot be known certainly to be true. Thus, a student may decide to return to college for his senior year on the assumption that his draft board will not call him to service before the year is over. Or, an officer may solve a morale problem by reassignment of duties on the assumption that his best subordinate officers will not be transferred during the next 6 months. It is well to understand what assumptions are being made in solving a problem, for these assumptions qualify the solution. What one must sometimes say of a solution is that it will be satisfactory provided such and such improbable event does not occur.

ON WHAT CONDITIONS MUST THE PROBLEM BE SOLVED? Usually the resources in manpower, material, time and money available for use in solving a problem are limited. If so, these limitations should be noted and kept in mind from the beginning. There is no object in evolving a perfect solution that will require the expenditure of three times as much money as will be available.

BY WHAT CRITERIA SHALL SOLUTIONS BE EVALUATED? Criteria are the requirements or specifications a solution must meet if they are to solve the problem. We may think of criteria as the yardsticks by which possible solutions will be measured. Often we can determine the criteria by asking such questions as the following: "What objectives must we accomplish to solve the problem?" "What values must we conserve to solve it?" "What difficulties must we remove or what favorable conditions must we create to solve it?" For example, a laboratory of the Air Force Systems Command might be asked to solve the problem: "What dehydrated survival ration can be developed that will keep a man alive for ten days under condition of active arctic survival?" The list of criteria might include the following:

The ration must be palatable or reasonably so.
It must not provoke thirst.
It must leave a man with the sensation of being full.
It must contain sufficient calories.
The ingredients must be combined so the ration can be packaged.
After packaging, the ration must withstand deterioration during long period of storage.

STEP 3 - List Possible Solutions

When a problem has been located and analyzed and the necessary data have been collected, it is time to project possible solutions from which a choice can be made. Sometimes this is a simple matter-only two or three solutions are possible, and it is obvious what they are. Occasionally only one solution is possible and we must decide whether to accept it or reject it, as when a voter at the polls must decide whether to vote for or against bond issue. But these cases are not typical. More often, many solutions are possible. We may or may not know in advance what some of them are. Teachers are often confronted by problems that have never arisen before and for which no possible solution is known. Here, success depends on sheer inventive genius, for nothing is more difficult than to think up a really new idea. Two conditions are favorable to the process of invention. One is the quiet and freedom from distraction that usually can be found only in solitude. Some problem solvers report that they think best while taking a solitary walk or when puttering around in the garden; others have their best ideas while shaving or while staring at the ceiling after everyone else has left the office for the day. Each of us must learn by trial and error under what conditions his mind works best, but most will find that quiet and freedom from distraction are essential. Another condition favorable to creative thinking is to get one's mind at work on the problem early enough so that a period of incubation can occur before a decision must be made. Many report that they think of their best ideas after they have worked hard on a problem and then set it aside to simmer for a few days. It is as if the mind works on the problem subconsciously while they are thinking of something else, with the result that usually good ideas occur to them later when they least expect them.

More specifically and positively, how does an expert problem solver set about the search for possible solutions? He is likely to spend a good deal of time prowling around the problem and the data, asking himself questions: "What does this mean?" "What causes this?" "How does this resemble something else I know?" "What would happen if we did this?" etc. Now and then an idea for a possible solution pops into his head. He doesn't stop to criticize it but jots it down on paper before it evaporates, and goes on. He is especially hospitable to ideas that at first glance seem rather absurd, for he knows that a really new idea usually looks absurd at first, and even if on later examination it does prove to be silly, it may suggest another idea worth considering. During this process he does not stop to criticize another idea worth considering. During this process he does not stop to criticize or evaluate the ideas, for the exercise of critical judgment tends to inhibit the creative imagination. Having accumulated a list of ideas for solutions, he likely to go over the list carefully, not to evaluate the ideas but to let his mind dwell on each as he explores its implications and possibilities. Often one of the ideas will suggest another, which he immediately adds to the list. The essence of his method is to be very inquisitive, to especially receptive to ideas that at first look absurd, to avoid making critical judgments, and to jot down ideas before they get away from him.

We have suggested that the free flow of ideas is facilitated by avoiding critical appraisal of the ideas. It is facilitated also by the stimulation of other minds engaged cooperatively in the "thinking up" process. For this reason it may be useful to hold a brainstorming session in which ten or a dozen persons interested in the problem sit around a table for half an hour and thinking up ideas together. One member should be in charge to enforce the following four simple rules:

a. Critical judgment on the ideas suggested is forbidden. It inhibits the free flow of ideas.
b. Let the mind range freely. Even ideas that sound absurd are welcome. They may not be as foolish as they sound and, even if foolish, may suggest a good idea to someone else at the table.
c. Contribute as many ideas as possible and as rapidly as possible. The more ideas we have, the more likely it is that a few good ones will be among them.
d. Ideas that combine, adapt, or improve on ideas previously suggested are welcome.

While the brainstorming session is the progress, a clerk or stenographer should note down the ideas as they are presented. By the end of a 30-minute session, he will often have upwards of a hundred ideas for later examination and appraisal, and among them are likely to be at least a few of orginality and value.

STEP 4 - Test Possible Solutions

With possible solutions before him, it is now the problem solver's task to compare them, to evaluate them and to choose the best. In evaluating each, he should raise three questions:

HOW WELL DOES IT SATISFY THE CRITERIA? Unless it meets the criteria or requirements determined during the first step of problem solution (recognize the problem), it presumably will not solve the problem. How well it satisfies the criteria determines how completely it will solve the problem.

HOW WELL DOES IT MEET THE CONDITIONS UNDER WHICH THE PROBLEM MUST BE SOLVED? Can it be put into operation with available resources of personnel, material, time, and money noted in Step 2 as setting the limits within which a solution must be found?

HOW DIFFICULT WILL IT BE TO IMPLEMENT? A solution that satisfies the criteria and meets the conditions for solution referred to in the preceding paragraph may still be difficult to implement. It may, for example, require the cooperation of a great many people or may necessi necessitate elaborate and inconvenient changes in existing procedures. These difficulties should be considered in appraising the solution.

STEP 5 - Select Final Solution

Having compared and evaluated each of the possible solutions, the problem solver must select the one that on the whole seems most promising. Often this will involve weighing one criterion consideration against another. One criterion, for example, may be more important than another. A solution that meets this criterion well may be preferable to another that doesn't meet it as well, although on other counts, the second solution might seem the better. In selecting the best solution one may, of course, combine the best features of several solutions.

To accept even a promising solution does not immediately solve the problem, for the solution must be put into operation. In some cases this in itself is a considerable task. It involves planning the details and procedures necessary to set the new policy in motion. It may involve seeking the cooperation of persons not under the problem solver's control. It usually involves the assignment of specific responsibilities and duties to subordinates.

Few problems can be considered finally solved until the solution has been tried in practice and the results appraised. Where the solution is applicable to the entire community or to a large part of it, it is, of course, wise to try out the solution in one unit or area before adopting it generally.

You should be careful when collecting data on the result of this trial run. The problem solver will wish, when possible, to personally observe the result of the trial. He may appoint others to assist in observing and to turn in reports or fill out questionnaires supplying data and recording judgment. Only when these data have been assembled is final evaluation of the solution possible.

Should major changes in the solution be indicated, the problem-solving process begins all over again. Trial of the solution may have provided new data that calls for restating the original problem, or the passage of time may have altered the basic conditions under which the problem was solved in the first place. The problem solver's familiarity with the data-the data that he collected formerly and the new data available-should give him a sense of direction in finding a new and better solution.

THE CASE METHOD OF PROBLEM-SOLVING INSTRUCTION

A popular method of using the problem-solving approach in learning is called the CASE method of instruction.

A case is a summary of a problem or incident that actually happened. It describes a situation about which a decision must be made as to the best course of remedial action. The cases which you will be studying in this course differ from law school cases in both nature and purpose. While a law case is essentially a decision which must be followed in all subsequent like cases, our cases represent a situation about which something is yet to be decided. Our cases are more like the cases used in medical schools-each case is a patient to be examined. By examination of the data presented in the case, the student should be able to interpret the data into a diagnosis and prescribe a treatment.

In a sense, a case is a description of a problem or situation which requires the student to "do something." The student must act like a real commander or supervisor would act in solving a real problem. He is required to identify himself with the commander or supervisor described in the case. The case involves him in the environment of the organization or setting of the problem. In resolving the problem or situation outlined in the case, he must decide upon a course of action in the same manner that a real live commander or supervisor would do.

The case method is effective in management and human relations education because it encourages the student to think for himself. It gives him the opportunity to develop desirable managerial traits and abilities through practice in solving real-life problems. These abilities include skill in making sound decisions, perspective in understanding the viewpoints of others, and insight into the job to be done. The case method also enables students to cultivate a desire to engage the unknown, a willingness to accept responsibility for personal decision, and skill in defining management problems.

What are the special advantages of case method?

The case method, in all its many forms, helps to bridge the gap between theory and practive. For the student in the classroom, it is a means of contact with the world of reality. It provides him a realistic vehicle on which to apply the principles and theory gained from classroom lecture and individual study. No longer must he remain in a passive role, always on the receiving end of principles and theory.

The case method encourages self-involvement and self-education. It presents the student with the opportunity to meet new situations in which he must grapple with new facts, half-facts, opinions, allegations, and misunderstandings. The benefits of this experience are maturation and the ability to perceive, diagnose, and remedy real-life problems. The student is required to examine the actions, motives, and feelings of the person identified in the case in order to interpret and understand their behavior. Through participation of this kind, experience and insights are gained which enhance the student's ability to solve real problems in the future.

One of the more important advantages of the case method is that it is a group method. Participation in classroom discussion of a case is considered excellent preparation for future occupancy of positions of authority and responsibility where things are increasingly done through group effort.

Ability and strength to act responsibly in a specific situation is not gained through the accumulation and memorization of a body of facts. There never has been a list of rules compiled which would insure success in every situation. Through the case method, the student learns THAT NO TWO PROBLEM SITUATIONS ARE EVER ALIKE IN ALL RESPECTS AND IT IS SELDOM, IF EVER, THAT A PARTICULAR SOLUTION CAN BE APPLIED TO MORE THAN ONE PROBLEM WITHOUT MODIFICATION.

In What way is the case method suited to leadership training?

The case method is more productive and can be used most effectively when the purpose of the instruction is to gain an understanding of human behavior and leadership skills, rather than technical knowledge and know-how. Consider the case of an aeronautical engineer. If he attempted to gain the necessary knowledge of formulas and scientific processes through use of the case method, it is doubtful whether he would ever progress past the fundamentals. On the other hand, the problems which he must face in dealing with people, in understanding their motives and feelings, in gaining acceptance of his ideas and programs, in motivation of subordinates, and in securing willing cooperation from fellow workers would be profitable subjects for the case method.

The case method offers you the opportunity to imporve yourself in the

three interrelated areas of knowledge, attitudes, and skills. In the classroom, through the process of lecture and self-study, you can be taught perfectly to understand management and human relations skills. The case method makes it possible for you to apply these skills in evaluating a problem situation and in recommending a course of remedial action. In doing this, as you study one case after another you find that each problem situation is different, never duplicating another situation in all respects. Through the case method, you can achieve the understanding necessary to know when and how to apply your skills.

Since it will be necessary for you to develop and to defend your own proposals about what is wrong and what should be done in a case, you gain the experience of dealing with problems which were actual problems for actual commanders and supervisors. There is an old story about the young lieutenant who was unhappy in his first assignment because none of the problems his commander gave him to solve were exactly like the problems he had studied in school. He defined his difficulty: "If someone would only give me a problem I know, I could solve it. But all I see here is a mess!" He had graduated with honors but felt that he was failing his first assignment. The case method should impress you with the fact that no two problems are ever alike. This being so, you should not try to solve two different problems with the same solution. This method of study gives you experience in solving problems. This experience will help prepare you for positions of increased responsibility.

Problem-solving activities within the classroom will vary from one area of course content to another. Basically, the five steps explained earlier will be used in each area simply because this is a logical method of problem solving. For example, it would be senseless to jump to a conslusion or solution before deciding just what the problem is.

In some student problem-solving activities. Individual instructions concerning your preparation for, and participation in, problem-solving activities will be provided.

In order to be adequately prepared for this, you must be familiar with the facts and conditions of the problem situation (case). Using the problem-solving approach (five steps) you will attempt to produce a plan of action to rectify the problem.

INTRODUCTION TO PROBLEM SOLVING

How do you define a problem? Here are some possible definitions. Reach each of them, and indicate the response of your choice by placing a check mark in the space provided.

_____1. A problem is a question raised for inquiry, consideration, or solution.
_____2. A problem is an unsettled question.
_____3. A problem is a source of perplexity or vexation.

Which response did you select? Although each of them describes a problem differently, all of them are equally correct. This is because:

1. A problem must have been raised for consideration in order to qualify as a problem.
2. A problem is, by its very nature, an unsettled question. If it has been settled, it no longer qualifies as a problem.
3. Problems, because they are problems, are perplexing.

Why is it that problems are so perplexing? Check the response of your choice.

_____1. Problems are perplexing because they are inherently difficult to solve.
_____2. Problems are perplexing because they stand between us and some goal.

There is nothing inherently difficult about solving problems. Sure, some problems are more difficult to solve than others, but this is because some problems are more complex than others. It is not because the problems themselves resist being solved. When a problem appears to be resisting solution, it is usually the fault of the problem solver who is resisting the application of the correct problem solving technique.

The existence of a problem is concrete evidence of the existence of some obstacle between an individual and a goal. We do not, however, solve obstacles. We solve the problems that are associated with the existence of obstacles.

Which of the following situations illustrates the existence of a problem? Check the response of your choice.

_____1.	An individual	An obstacle	No defined goal
_____2.	An individual	An obstacle	A defined goal
_____3.	An individual	No obstacle	A defined goal

When the goal has not been determined, as in the first choice, there can be no problem because an obstacle cannot exist when the goal has not been defined. If there is no obstacle between the individual and his goal, as in the third choice, there can be no problem. It is

only when an obstacle stands between an individual and his goal, as in the second choice, that a problem exists.

In the spaces that follow, we want to list the three essential elements of every problem situation.

1. _____

2. _____

3. _____

The correct response is obvious. The three essential elements of any problem situation are the individual, the obstacle, and the goal. If you are to correctly identify the problem that requires a solution, it is absolutely essential that you correctly identify these three elements of the problem situation.

In the following narrative, see if you can correctly identify the individual, the obstacle, and the goal.

> As you drive to work each morning, you are confronted with intensely heavy traffic at the corner of Fourth and Elm. On several occasions, this has caused you to be late for work. Your supervision is unhappy with you, and you are in danger of losing your job because of your chronic lateness.

We are not going to ask you to list the individual, the obstacle, and the goal, but they are all there. Did you spot them? We are going to ask you, however, if you can identify the problem in the preceding narrative. When you think you have the problem identified, check the response of your choice.

_____1. The problem is how to get to work on time.
_____2. The problem is how to ease the traffic congestion at Fourth and Elm Streets.

How did you respond? Did you select the traffic congestion at Fourth and Elm as the problem to be solved? If you did, you made the deadly mistake of confusing the obstacle with the problem. As is the case with other obstacles, it is probably far beyond your ability to ease the traffic congestion at Fourth and Elm. Remember, we do not solve obstacles. We identify obstacles, and we solve the problems arising from the existence of these obstacles.

What about the other choice, "How to get to work on time?" Is that the problem? It might be, but don't count on it. At this point in the problem solving process, you may find it necessary to tentatively identify the problem as how to get to work on time, but be ready to restate the problem, because it may turn out to be "how to keep the boss happy" or "how to avoid being fired."

We can only tentatively identify the problem in the preceding narrative at this time. Why is this so? Check the response of your choice.

_____1. Because the narrative is misleading.
_____2. Because there is not enough data.

The correct response is that there is not enough data. In the narrative, we said practically nothing about the individual with the problem, we described the obstacle in a very general way, and we referred to the goal only directly. No, you need much more data than that if you are to correctly identify the problem. How do you go about assembling this data?

To begin, you would get a significant part of this required data from an analysis of the total problem environment. The total problem environment consists of these three parts:

1. An individual,
2. An obstacle, and
3. A goal.

In order to assemble the data necessary for the correct identification of the problem, you must analyze and interpret the relationship of these three parts.

Suppose that you are the individual with the problem. Which of the following best describes the type of analysis that you should conduct?

_____1. I would begin with an analysis of the obstacle that is interfering with goal accomplishment. After determining the way in which the obstacle is interferring, I would gather enough additional data to enable me to correctly identify the problem. When I had the problem correctly identified, I would find a solution to it.

_____2. I would begin the analysis with an examination of my own frame of reference and the way in which this frame of reference might affect the problem solution. I would then examine the goal and the obstacle in the same way in order to determine how these parts of the problem environment will affect the problem solution. Only then would I attempt to identify the problem.

Don't be guilty of attempting to solve problems in the way described in the first choice. To do so means that you believe that a problem situation involves only a obstacle and a resulting problem. Nothing could be further from the truth. Even when the individual is you and the goal is your own, there is much to be learned about these parts of the problem environment, and only a comprehensive analysis of the total problem environment will reveal these things to you.

There is no single way to solve problems, but there is a best way. On the pages to follow, we present a technique of problem solving which, if correctly applied, will make you a better problem solver than you now are.

A TECHNIQUE OF PROBLEM SOLVING

A "Technique" is a systematic method of accomplishing a desired aim. The technique of problem solving that we present here requires the systematic application of six consecutive steps. To begin this presentation, we shall present all of these steps together so that you can see how they relate to one another. After you have seen the steps together in this fashion, we shall go into each of them in more detail so that you can see all of the separate tasks required by each step.

Here are the six steps in scrambled order. Can you, without looking ahead in the text, place them in their correct order of application? Since we have already talked at length about step one, you should have no trouble getting started.

Select the best solution to the problem
List possible solutions to the problem
Recognize the problem
Implement the problem solution
Gather data relative to the problem
Test possible solutions to the problem

The sequence in which these steps should be applied to a problem solution is as follows:

Step one is _____

Step two is _____

Step three is _____

Step four is _____

Step five is _____

Step six is _____

Here are the steps arranged in the order in which they are applied to a problem solution.

Step one is recognize the problem.
Step two is gather data relative to the problem.
Step three is list possible solutions to the problem.
Step four is test possible solutions to the problem.
Step five is select the best solution to the problem.
Step six is implement the problem solution.

We have already seen, in the introduction to this text, that it is sometimes difficult to accomplish step one of this sequence. This is because we often confuse the obstacle with the problem, or it is because we do not have enough data. We saw, however, that a thorough analysis of the total problem environment will go a long way in making the task of recognizing the problem much easier.

Would you say that this analysis of the total problem environment has an effect on the remaining steps of the problem solving sequence? Read each of the following paragraphs, and decide if what we say in these paragraphs concerning steps two through six of the problem solving sequence is true. When you have decided, make the responses that are required after each paragraph.

Step two is gather data relative to the problem. Problem solving involves the use of facts realtive to the problem situation. These are facts that the problem solver already knows, or they are facts that he can accumulate. Your analysis of the total problem environment will assist you in determining how much you already know about the problem situation as well as how much and what type of research will be required to fill gaps in your knowledge.

Select one of the following responses concerning the validity of the preceding paragraph.

_____1. The analysis of the total problem environment will affect step two of the problem solving sequence in a way similar to that described.

_____2. The analysis of the total problem environment will not affect step two of the problem solving sequence in the manner described.

The first choice above is the correct response. Your analysis of the total problem environment will inevitably indicate those areas in which your knowledge is deficient. It will also provide you with valuable guidance for whatever research is required.

Step three is list possible solutions to the problem. The best possible solution to any problem can only be derived after the consideration of several alternative solutions. In order to prepare a list of acceptable alternatives, the problem solver must know the possible effects of the alternative solutions on the obstacle, on the goal, and on himself. These possible effects can only be evaluated on the basis of what is known about the three elements of the problem environment, and only an analysis of the total problem environment will provide this information.

Select one of the following responses concerning the validity of the preceding paragraph.

_____1. The analysis of the total problem environment will affect step three of the problem solving sequence in a way similar to that described.

_____2. The analysis of the total problem environment will not affect step three of the problem solving sequence in the manner described.

The first choice above is the correct response. "Know thyself" is an excellent piece of advice in determining what constitutes a possible solution to a problem. Your frame of reference and your goals will not tolerate certain solutions.

Step four is test possible solutions to the problem. The way in which we determine whether or not a possible solution is acceptable is to put that solution to a test. This test consists of applying such criteria as economy, suitability, and feasibility. Certain aspects of criteria such as these can be highly subjective and hence not always readily apparent, and it is only through our analysis of the total problem environment that we can determine these subjective criteria.

Select one of the following responses concerning the validity of the preceding paragraph.

_____1. The analysis of the total problem environment will affect step four of the problem solving sequence in a way similar to that described.

_____2. The analysis of the total problem environment will not affect step four of the problem solving sequence in the manner described.

The first choice above is the correct response. It is only through a thorough analysis of yourself and your goals that you can determine a subjective criterion such as suitability. Without these criteria, you cannot hope to put the alternative solutions to a test.

Step five is to select the best possible solution to the problem. "The best possible?" Of course, the best possible solution is that solution which meets most of the criteria. This selection process cannot be accomplished unless all of your criteria are valid. The criteria cannot be valid unless they are based on a thorough analysis of the problem solver, the obstacle, and the problem solver's goal.

Select one of the following responses concerning the validity of the preceding paragraph,

_____1. The analysis of the total problem environment will affect step five of the problem solving sequence in a way similar to that described.

_____2. The analysis of the total problem environment will not affect step five of the problem solving sequence in the manner described.

The first choice above is the correct response. You test the possible solutions for the purpose of arriving at a single solution that meets most of the criteria. If the criteria are faulty because they are invalid or incomplete, you cannot expect your chosen solution to be the best solution to the problem. One sure way to invalidate your criteria is to fail to consider all aspects of the problem environmnet.

Step six is to implement the problem solution. Your analysis of the total environment will have revealed much about the ability and the authority of the problem solver to implement the problem solution. This analysis will also have indicated the need for funds, manpower, equipment, training, etc. that the implementation of the solution will require.

Select one of the following responses concerning the validity of the preceding paragraph.

_____1. The analysis of the total problem environment will affect step six of the problem solving sequence in a way similar to that described.
_____2. The analysis of the total problem environment will not affect step six of the problem solving sequence in the manner described.

Well, if you are not convinced by now that it is imperative for you to analyze the total problem environment, we don't know what it will take to convince you. The ease with which you can apply the six steps of the problem solving sequence will be determined, to a great extent, by your thoroughness in analyzing interfering with goal accomplishment, and the individual's goal.

On pages to follow, we shall examine the six steps of the problem solving sequence, and we shall see how each of these steps contributes to the final solution of the problem.

STEP ONE - RECOGNIZING THE PROBLEM

This first step in problem solving, that of correctly identifying the problem is so critical to the problem solving process that it is the first step in ALL recognized techniques of problem solving. To identify the problem incorrectly and then to spin your wheels working on a solution to the wrong problem is probably the greatest sin of problem solving.

Here is an exercise in the tentative identification of a problem. Read the following narrative carefully, and see if you can determine what the problem is from the information that is presented.

From the company semi-annual expense accounting, the executive vice-president has determined that the cost of power mower maintenance for the first six months of the previous fiscal year. The vice-president has directed you, the chief of Civil Engineering, to cut the cost of mower maintenance to a level that will insure that this year's total maintenance cost will not exceed last year's total cost.

Can you tentatively identify the problem from that narrative? Select one of the following responses.

_____1. The problem can be tentatively stated as "to find ways to reduce the cost of mower maintenance."
_____2. There is not enough data available to tentatively identify the problem.
_____3. There is no problem suggested in the narrative.

The correct response is choice number two. If you selected the first response, than you have oversimplified the difficult task of recognizing the problem. In doing so, you have overcomplicated the search for a solution.

No, we cannot identify the problem as yet. We do not have the complete picture of the total problem environment. You determine what part of the problem environment is missing by completing the following blanks.

1. The goal is_____

_____

2. The person desiring to reach the goal is_____

_____

3. The obstacle interfering with goal accomplishment is_____

_____

For the goal, you should have entered the reduction in maintenance costs that the vice-president requires. This would be phrased in your own words, of course.

For persons desiring to reach that goal, you should have entered yourself as chief of Civil Engineering. We hope that you remembered to add that you are a conscientious manager who will get the costs down and still get the grass cut. This is the sort of evaluation that is so critical to the choice of the final solution.

What is the obstacle that is interfering with goal accomplishment? At this point, who knows? It may be that the operators are abusing

the equipment, or it may be that the mowers are so old that they cannot be economically repaired.

Let us suppose, for the sake of our discussion, that you conduct an investigation of the mower maintenance costs, and you determine the following:

1. The equipment is experiencing more major breakdowns this year than was the case last year.
2. Although some operators are abusing the equipment, this is only one of the causes of the breakdowns.
3. Parts from suppliers have increased significantly in cost.

With this additional data, can we identify the obstacle now? See if you can complete the following.

1. The goal is to reduce the costs of mower maintenance to last year's level.
2. The person desiring to reach the goal is you, a conscientious chief of Civil Engineering who will reduce costs and get the grass cut.
3. The obstacle is_____

_____

The obstacle you should have identified was that of more major breakdowns of equipment (caused by a variety of reasons) and the increased costs associated with these breakdowns.

With this analysis of the total problem environment, you should now be able to tentatively identify the problem, and you should be able to develop a tentative statement of the problem. Why is a tentative statement of the problem needed at this time? Answer this question by selecting one of the alternatives below.

_____1. Once a tentative statement of the problem is developed, you are ready to select and to implement the problem solution.

_____2. The development of a tentative statement of the problem forces you to reevaluate the total problem environment in the context of this statement.

The correct response is number two. This evaluation of the tentative statement of the problem in the context of the total problem environment helps you to relate the problem to a cause instead of to an effect. In many instances, when we fail to relate the problem to a cause, our efforts toward finding a solution will be misdirected to treating the effects of a problem. Preventing this misdirection is the primary reason for developing a tentative statement of the problem at this early stage of the game.

Let us suppose that you have tentatively identified the problem as one of reducing major breakdowns. You now have to make a tentative

statement of the problem. This statement must be phrased in one of three ways:

1. As a question. "How can we...?"
2. As a statement of need. "We need to..."
3. As an infinitive phrase. "To find ways to..."

To state a problem in one of these three ways is a part of the systematic approach to problem solving. Any one of these three statements will serve as a definite guide for your research in the "gather data" phase to come.

In the spaces to follow, make a tentative statement of the power mower problem in each of the three ways that we have specified.

1. As a question _____

2. As a statement of need _____

3. As an infinitive phrase. _____

With the tentative statement of the problem behind us, we have completed step one, recognizing the problem. We may have to return to this step if we find that our statement of the problem requires revision, but we can leave the step for now.

Before going on to the second step of the problem solving sequence, let's have a brief review of the material covered to this point. In this review, make all of the responses that are required.

Which of the following actions must we accomplish if we are to correctly identify the problem? Check the response of your choice.

_____1. Conduct a thorough analysis of the goal that is being interfered with.
_____2. Conduct a thorough analysis of the total problem environment.
_____3. Conduct a thorough analysis of the obstacle that is interfering with goal accomplishment.

The correct response is number two.

When the total problem environment has been analyzed, and the problem had been tentatively identified, the next step is to do which of the following?

_____1. Seek an acceptable solution to the problem.
_____2. Develop a tentative statement of the problem.

The correct response is number one.

This completes the review of step one. Before going on to step two, let us leave you with this thought. Here is a tentative statement of the power mower problem. There is something wrong with this statement. Examine it carefully, and select one of the choices below that best describes this fault.

To find ways to reduce mower breakdowns

_____1. The phrasing of the statement is not consistent with the rule which states that the tentative statement of the problem must be phrased as a question, as a statement of need, or as an infinitive phrase.

_____2. The phrasing of the statement leaves the problem much too broad to be dealt with effectively. The problem should be limited in size, and this statement of the problem does not accomplish that.

Which of the above choices did you select? Number two is the correct choice. It is a valid criticism of the tentative statement of the problem as you will soon see.

On the following page, we go into the second step of the problem solving sequence, gathering data relative to the problem.

Step Two-Gathering Data Relative to the Problem

Note the words "gathering data" in the title above. These words should seem to indicate that it is in this second step of the problem solving sequence that we first turn our attention to gathering data. This is not the case at all. We have already been involved in the process of gathering data when we made our analysis of the problem environment in the preceding step.

Which of the following statements is the more accurate description of this step of the problem solving sequence?

____1. The gathering data step of the problem solving sequence follows the step in which we tentatively identified the problem and prepared a short tentative statement of the problem. This step, gathering data, represents the first opportunity in the problem solving sequence to accumulate facts relative to the problem.

____2. The gathering data step of the problem solving sequence follows the step in which we tentatively identified the problem and prepared a short tentative statement of the problem. This process of gathering data began when we first analyzed the total problem environment, and it will continue throughout the problem solving sequence.

The correct choice is number two. Gathering data is a continuing process that begins with the recognition that an obstacle exists and it continues up to the time that the final solution is implemented.

The data that the problem solution requires may be classified as the following:

1. Facts
2. Assumptions
3. Criteria, and
4. Definitions.

While all of these four types of data are important, two of the above types are more important to the problem solving process than the other two. Do you know what these two types are? Complete the following statements.

One of the above types of data is important because this type of data represents the truths upon which your solution to the problem is based. These truths are classified above as_____

Another of the above types of data is important because this type of data defines the limits within which your solution to the problem must fall. These solution limits are classified above as_____

_____

Your first response should have been facts, and your second response should have been criteria. These two types of data are the foundation stones of your problem solution.

The following statements are both facts and criteria as they relate to the power mower situation. Following each of the statements, you will find a blank. Read each statement, and write in the blank whether you believe that statement to be a fact or a criterion.

1. The total cost for base lawn mower maintenance for fiscal year 1966 was $855.00._____

2. The total cost for lawn mower maintenance for fiscal year 1967 must not exceed $855.00._____

3. Irrespective of the financial restrictions placed on power mower maintenance the grounds must be maintained._____

   _____

4. The cost of mower maintenance for this base for the first half of fiscal year 1967 was $589.00._____

5. The average cost of mower maintenance for six other bases of equivalent size during fiscal year 1966 was $601.75._____

   _____

6. All money spent on mowers during fiscal year 1967 must be for maintenance since there are no funds to buy new equipment._____

   _____

Your responses to the above statements should be as follows:

1. Fact
2. Criterion
3. Criterion
4. Fact
5. Fact
6. Criterion

Here is another piece of data. How would you classify it?

If the present trend in maintenance costs continues, the cost for Fiscal Year 1967 could exceed $1200.00.
The above statement is which of the following?

_____1. A Fact
_____2. An Assumption
_____3. A Criterion
_____4. A Definition

The statement above is an assumption. An assumption is a statement that may or may not be true, as is the case with the statement above, but the available facts indicate that it is true, or that it will be true.

How would you classify this piece of data?

A linked bracket is a mechanical device that automatically disengages the cutting blades when the operator's brain is not in gear.

The above statement is which of the following?

_____1. A fact
_____2. An assumption
_____3. A criterion
_____4. A definition

Definitions, such as the above, are required when you are preparing a report of your final solution, and this report contains words or terminology that might be unfamiliar to your reader.

Because of the importance of facts and criteria to your problem solution, we shall cover these in a little more detail before going on to the third step in the problem solving sequence.

We have already seen that the accumulation of facts relative to the problem situation begins with the first step of the problem solving sequence, and it continues through this step. To this point, where would you guess that most of the facts have come from?

_____1. From the observations of an expert.
_____2. From your own experience.

Definitions, such as the above, are required when you are preparing a report of your final solution, and this report contains words or terminology that might be unfamiliar to your reader.

Because of the importance of facts and criteria to your problem solution, we shall cover these in a little more detail before going on to the third step in the problem solving sequence.

We have already seen that the accumulation of facts relative to the problem situation begins with the first step of the problem solving sequence, and it continues through this step. To this point, where would you guess that most of the facts have come from?

_____1. From the observations of an expert.
_____2. From your own experience.

The most available source of factual data will always be your own experience. Whether or not you realize it at the time, there will be few problems that you are called upon to solve about which you do not already have a tremendous store of knowledge. Is this equally true of the criteria? Do most of the criteria for a problem solution come from the problem solver, or do they come from some outside source? Check one of the following responses.

_____1. The criteria for a problem solution are always provided in complete form by a superior when the individual is assigned the problem to solve.
_____2. The criteria for a problem solution are usually inherent in the nature of the obstacle causing the problem. The obstacle can only be overcome within certain physical limits, and these limits will establish the criteria for the problem solution.
_____3. The criteria for a problem solution are usually inherent in the problem solver's own frame of reference and in the goal that the individual is trying to attain. This goal and this frame of reference will tolerate only certain problem solutions, and the limits of this tolerance will establish the criteria for the problem solution.

Which of the above choices did you select? To be sure, there are times when the first two choices will be partially correct, but, in the majority of cases, choice three reflects the basis of most criteria.

The following statements are typical of criteria that come from an outside source as well as from the individual problem solver himself. Indicate by a check mark in the spaces provided those criteria that you believe arise from the problem solver's own frame of reference and from his goal.

_____1. I don't know how I will resolve this problem, but I do know that the solution cannot cost too much to implement because my budget is so strained.

_____2. Oh sure, that solution appears to be the best solution, but it goes against everything in which I believe.
_____3. If this problem is not resolved by 4:00 p.m. the V. Pres. will have my sclap.
_____4. I would like to do it that way. If it works, however, I might as well forget about going on vacation this fall.
_____5. Not only do we have to find a solution, but we have to find a cheap solution because the V. Pres. says there are no more funds for this project.
_____6. This is a very sophisticated solution, and that is precisely why it will not be acceptable to the V. Pres. It is too sophisticated.

Criteria one, two and four above are those criteria that are derived from the problem solver's own frame of reference and from his goal. The other criteria came from an outside source.

During the gathering data step of the problem solving sequence, there will be times when you accumulate some opinions. Opinions, irrespective of their source, are of only limited value in reaching a solution to a problem. This is true because solutions to problems must be based on data that is demonstrably true. Opinions, however well intended, do not meet this test. As you gather data to be used in support of a problem solution, you will be required to evaluate each item in order to determine if it is fact or opinion.

Here are some definitions of fact and opinion. Use these definitions as your basis for an evaluation of the statements that follow.

A fact is an observed event, past or present, that has been personally observed or has been observed and reported to you.

An opinion is a personal judgment that you have made or that some other individual has made.

Some of the statements below are facts, and some are opinions. After you read each statement, identify it as a fact or as an opinion by writing fact or opinion in the space provided next to each statement.

_____1. The Garret Fixit Shop charges $14.00 for overhauling the engine in one M4A power mower.

_____2. "I think $14.00 is too much to pay for any small engine overhaul," said Mr. Berg, an educational specialist.

_____3. "Maintenance costs can be reduced $2.50 for each overhaul by installing parts made in our factory," said Mr. Bear, a factory representative M4A power mowers.

_____4. If automobile accidents continue to increase, it is a certainty that automobile insurance rates will increase.

_____5. There are 114 extra power mower parts presently stored in the company warehouse.

_____6. I think power mower breakdowns could be greatly reduced if the abuse to the mowers could be eliminated.

_____7. Mr. Jones has $500.00 to spend on a new boat.

_____8. If the present trend of tardiness continues, Mr. Schnazz will be late for work again Friday.

The correct responses for the preceding statements are as follows:

1. Fact
2. Opinion
3. Opinion
4. Opinion
5. Fact
6. Opinion
7. Fact
8. Opinion

Statement number three is questionable. If Mr. Bear can produce enough evidence to prove his statement, it will be a fact. Otherwise, it must be considered an opinion. This statement, along with other statements, becomes useful evidence to support problem solutions only when it can be accepted as a fact.

This completes our examination of step two of the problem solving sequence. We will go now to the third step in the sequence, list possible solutions to the problem.

Step Three-List Possible Solutions to the Problem

By the time that you get to this third step in the problem solving sequence, you will have most of the data that the problem solution requires. As a part of this data, you will have defined many of the criteria that will set the limits for the selection of the final solution. You are now ready to give your imagination free rein and to list as many possible solutions to the problem as your facts and assumptions will support. Each of these possible solutions that you list must eventually be weighed against the criteria that you have established.

Let us assume that the criteria for the power mower situation are as listed below. Bear in mind that you are allowed to establish additional criteria later.

1. Spending on power mower maintenance for the remaining six months of this fiscal year must be reduced to a level that is 50 percent lower than the spending during the previous six months.

2. The grounds that are currently being maintained must continue to be maintained in much the same condition as they now are.

3. Money cannot be diverted from other areas to supplement the maintenance fund.

4. No new mowing equipment can be purchased.

5. The present equipment operators must remain on the payroll.

The following are possible solutions to the tentative statement of the problem, to find ways to reduce mower breakdowns. Indicate those solutions that are within the limits of the criteria just furnished by placing a check mark in the spaces provided.

_____1. Reduce wear and tear on the mowers by limiting grass cutting activity to certain areas of the base.

_____2. Replace all of the mowers that are experiencing major repairs with new equipment.

_____3. Fire those operators who may be abusing the equipment, and replace them with newly hired operators.

_____4. Establish and operate an intensive course in mower maintenance for all operating personnel.

There are many other possible solutions, but these will serve our purposes for now. Did you select choice number four as being the only choice within the limits of the criteria?

Since all of the above solutions are products of a creative imagination, let's pause at this time to have a brief discussion of creative thinking.

Creative thinking can be defined as the imaginative recombination of known elements into something new and different. Since all ideas are syntheses of our experiences, we probably never have a truly original idea. We can, however, be creative by consciously changing and recombining old ideas or by improving or modifying established procedures.

Here are three sources from which you can draw a possible solution to a problem:

1. Your experience
2. Your ability to think logically, and
3. Your ability to think creatively.

Here are the descriptions of the way in which three individuals derived a solution to a problem. Tell us, by writing logic, experience, or creativity in the blank provided which individual used which approach to derive a possible solution to a problem.

1. Mr. Ashley assembled a large number of facts about the problem. He then derived a possible solution based on a trend evident in those facts._____

2. Mr. Rose, while gathering facts for a problem solution, just happened to remember that this new problem was similar to one that he had been called upon to solve a year ago._____

3. Mr. Jones gathered a mass of data for the solution. He then recombined these elements of data in a most unusual way to derive a possible solution._____

While Mr. Ashley was deriving a solution logically, and Mr. Rose was basing a solution on his past experience. Mr. Jones was deriving a solution creatively. It is obvious that Mr. Jones knows about these barriers to creativity, and he knows how to overcome them.

Here are the principle barriers to creativity:

1. Habit - This is the reluctance to change from the old and accepted way of doing things.
2. Fear - This is the fear of adopting new ways and the fear of the old ways. This barrier to creativity also includes the fear of authority and the fear of being thought a fool for recommending the new and novel.
3. Inertia- This is resistance to change. This barrier to creativity includes a reverence for the traditional ways of doing things. It is demonstrated by a lack of desire to expend the energy necessary to effect a change.
4. Prejudice- This is the emnity toward or the affection for something. An example of this prejudicial affection is the pride of authorship.

Which of the following problem solutions suffered from the habit barrier to creativity?

_____1. We can improve the seating accommodations at this year's convention by renting bleacher seats from the local ball park.

_____2. If there is an overflow crowd at this year's convention, we shall deny them entry as we have always done.

The first choice represents the fear barrier to creativity at work.

Which of the following statements indicates that the fear barrier to creativity is at work?

_____1. You must think I am out of my mind. I would never propose such a solution to the old man.

_____2. This solution is out of the question because it requires that I modify my goals.

The first choice represents the fear barrier to creativity at work.

Which of the following statements indicates that the inertia barrier to creativity is at work?

_____1. Mr. White wants suggestions for new maintenance procedures, but he dosen't want anything that will require an expenditure of a lot of time and effort.

The second choice is representative of the inertia barrier to creativity at work.

Which of the following statements indicates that the prejudice barrier to creativity is at work?

_____1. This is my solution to the problem, and, while it may not be the best in every respect, I will see to it that it is accepted.

_____2. I agree that this is the best solution to the problem, but let's not make the superiors unhappy with a change.

Number one is an example of the prejudice barrier to creativity at work.

There you have the major barriers to creativity at work: Habit, fear, prejudice, and inertia. If these barriers can be overcome, your native powers of creativity can operate.

How can you overcome these barriers? The best way to begin is to develop a questioning attitude. To develop this questioning attitude, we may work individually, using some form of interrogation method, or we may work as a group, brainstorming a problem. We will take a closer look at both of these techniques for developing a questioning attitude. First, let's look at an interrogation method as it might be applied to the power mower problem.

_____1. How is it possible to maintain the mowers for the remainder of the fiscal year on the $266.00 remaining?

_____2. Could I find the solution by looking at mower maintenance from some other individual's point of view?

_____3. Is it possible that the solution to the problem lies outside my own organization?

Questions two and three have the potential for stimulating creativity, while questions similar to number one can only lead to frustrations.

Let's examine these last two questions more fully in order to see what they might prompt in the way of possible solutions to the problem.

Could I find the solution by looking at mower maintenance from some other individual's point of view?

Is it possible that the solution to my problem lies outside my own organization?

Which of the following possible solutions could have been derived from this creative questioning? Check the responses of your choice.

_____1. I see mower maintenance as a costly and complex operation. The Vice-President sees it as a simple and inexpensive process. A possible solution, therefore, is to convince him of my point of view so that he will increase the fund authorization.

_____2. I see mower maintenance as an unexciting but necessary chore. I am sure all of the shop personnel feel the same way. If I can locate individuals who consider small motor repair as an enjoyable and healthy diversion, they might give us a hand in maintaining the mowers for a minimum of pay.

_____3. It is possible that there are small motor repairmen in the local community who would welcome the opportunity to earn extra pay, and that pay might be significantly less than paid to shop personnel.

_____4. Since the maintenance of small engines is not too different from that of large engines, I will assign this mower maintenance task to the heavy equipment foreman.

Choices two and three are representative of the creative approach to problem solving. Choices one and four are extremely ill-advised in that they consider making your problem someone else's problem.

With that individualized way of stimulating a questioning attitude behind us, let's consider a group technique of accomplishing the same thing. This technique is called brainstorming.

Brainstorming is a group ideation technique that is designed to stimulate a chain reaction of ideas or possible solutions that relate to a stated problem. Since the basic purpose of brainstorming is to derive the maximum number of ideas and possible solutions, which of the following statements is the most valid description of a brainstorming session?

_____1. The members of the group advance as many ideas and suggest as many solutions as is possible in the time allowed without fear of criticism.

_____2. The members of the group evaluate the ideas and possible solutions as they are advanced, and they evaluate their potential application to the problem.

The first choice is correct. The whole idea of brainstorming is quantity, not quality.

To get the best results from a brainstorming session, there are certain rules and procedures that should be followed. We shall discuss four of these rules.

The first and foremost rule of brainstoming is to wothhold judgment. This simply means that no evaluation, criticism, or judgment of any kind should be made of an idea that is advanced by a member of the group until the brainstorming session is over.

Which of the following is most likely to happen if members of the group are permitted to evaluate and to criticeze ideas during the brainstorming session?

_____1. Some members of the group are likely to let evaluation and criticism of their ideas interfere with their flow of ideas.
_____2. Some members of the group are likely to become emotional to the point of their ideas becoming unrealistic.

The first choice above is correct. The flow of ideas from a group will almost invariably slow down or stop when a judgment of any kind is allowed during the session.

Which of the following statements indicates that the first rule of brainstorming is being broken?

_____1. A brainstorming session is being conducted in Room 14 for the purpose of obtaining ideas that might contribute to the solution of a stated problem. Every idea that is advanced is recorded and kept until the session is over.
_____2. A group of men in Room 12 are participating in a brainstorming session for the purpose of deriving as many possible solutions as they can to a stated problem. When an obviously inferior suggestion is made, it is discarded immediately.

The men in Room 12 are breaking the first rule of brainstorming by passing judgment. You should have checked number two.

The second rule of brainstorming is to encourage freewheeling. Freewheeling simply means that, once the leader of the session has the flow of ideas started, the leader allows the group to continue under its own steam with little or no guidance.

The following are narratives that describe some of the activities taking place in each of two brainstorming sessions. Which group is making the best use of the second rule of brainstorming?

_____1. Mr. Jones is a participant in a brainstorming session. Jones withholds his ideas because he believes they are invalid. At the very beginning of the session Mr. Barnes and Mr. Smith advanced some novel ideas, but they were criticized rather severely by other members of the group. As a result, Barnes, Smith, and Jones are now remaining silent.

_____2. A brainstorming session is being conducted in Room 202. Mr. Crane made a suggestion which sounded ridiculous, and this caused a hearty laugh that was jotted down by the recorder along with all of the other ideas that were coming in from the group.

Freewheeling is very much in evidence in description number two above. No matter how farfetched an idea is, you cannot be sure it is invalid until you have taken a long, hard look at it.

The third rule of brainstorming is one that we have already mentioned in passing. This rule is to aim for quantity, not quality. If enough ideas are presented during the session, some of them will contain the quality that is needed, but the selection of the quality ideas must wait until the session is over.

Which of the following groups is most likely to produce the best idea?

_____1. Group A stayed in session for 25 minutes, but they worked fast and produced a list of 21 ideas.

_____2. Group B stayed in session for 45 minutes, and they produced a list of 46 ideas.

Group B is more likely to produce the best idea, because this group has the larger list of ideas from which to choose. This need for producing a large number of ideas brings us to the fourth rule of brainstorming.

The fourth rule of brainstorming is to hitchhike ideas. This is a way in which a hitchhike idea rides in on another idea. In a brainstorming session, one member of the group suggests an idea. This idea triggers a thought in the mind of another member of the group. This continues to happen until there is a whole series of ideas that were all prompted by an orginal idea.

Identify the statement below that does the best job of describing the rule of hitchhike ideas in action.

_____1. The combination and improvement of ideas previously advanced.

_____2. The creation of a chain reaction by which one idea suggests another.

_____3. The attempt to get members of the group to be self-starters and to present ideas on their own initiative.

Numbers one and two above are both valid descriptions of hitchhike ideas, but number two, with the use of the term "chain reaction," does the best job of describing hitchhike ideas.

For a review of the four rules of brainstorming that we have just covered, determine which rule of brainstorming is depicted in each of the statements that follow. Write the rule in the space that follows each of the statements.

1. The group leader asks for at least 20 more ideas.

   _____

2. This suggestion reminds me of another idea that might help to solve the problem.

   _____

3. Don't ridicule the idea yet. It might turn out to be the best suggestion of all.

   _____

4. At first glance, some of the ideas the recorder jotted down in Room 91 sound crazy, ridiculous, absurd, and remote.

   _____

The rules of brainstorming in the preceding statements are as follows:
Number one is aim for quantity, not quality.
Number two is hitchhike ideas.
Number three is withhold judgment.
Number four is encourage freewheeling.

In addition to the four rules of brainstorming that we have just covered, there are some techniques for conducting a brainstorming session that should be decided upon and implemented by the group leader. Since you may find yourself in the role of the group leader, we have decided to discuss five of these techniques here.

1. The group leader selects a number of individuals to participate. The ideal number is from 12 to 15 members.

Why is the ideal group size of a brainstorming session from 12 to 15 members? Select your response from alternatives that follow.

_____a. Because the average size of most seminar groups in industrial management is from 12 to 15 members.
_____b. Because if the group is too small, fewer ideas are likely to be advanced. If the group is too large, some participants may not be able to present their ideas.

Response b. is the best reason for selecting 12 to 15 members.

2. The group leader must limit the problem to an area that the group knows something about.

What is the primary reason for limiting the problem?

Select your response from the alternatives below.

_____a. The group leader must prevent the group from presenting remote, farfetched and absurd ideas.
_____b. The group leader must assist the group in thinking in the same channels.

Response b. is correct.

3. The group leader must state the problem, and he must be sure that the problem is understood by each participant.

Which of the following participants do you think might not understand the problem to find ways to reduce mower maintenance costs?

_____a. Mr. Smith: "It's much more economical to repair tractors than automobiles."
_____b. Mr. Jones: "We can save money by buying mower parts at wholesale prices."

Mr. Smith either does not understand the problem or he is thinking about another approach to economy.

4. The group leader must appoint one or two recorders, and he must instruct them to write down all of the ideas mentioned by the participants.

It has been shown that, for best results, all ideas and suggestions should be written on a blackboard. What is the most obvious result of this practice?

_____a. It helps participants to remember what has been mentioned, and it stimulates hitchhike ideas.
_____b. It causes some participants to remain silent for fear of having their ideas exposed to ridicule.

You should have checked item a. above.

5. The group leader should avoid placing a time limit on the brainstorming session. The absence of a time limit on the brainstorming session allows the group leader to do which of the following?

_____a. Keep the group going for as long as he can stimulate them to produce ideas.
_____b. Keep the group going until the problem is completely solved.

If a time limit is placed on the session, the group might not produce all of the ideas of which they are capable. Item b. above is incorrect because brainstorming does not attempt to solve problems.

The self interrogation and brainstorming techniques that we have discussed do not guarantee creativity. They are, however, excellent tools that we can use to overcome the barriers to creativity.

STEP FOUR-TEST POSSIBLE SOLUTIONS TO THE PROBLEM

This is the time in the problem solving sequence in which you put all of the possible solutions to the test. The yardstick by which you measure these solutions is which of the following?

_____1. The acceptability of each of these solutions to your superiors.
_____2. The degree to which each of these solutions meets the criteria that you have established.

If you selected the first choice above, then you are only partially correct. While it is true that your supervisors may establish some of the criteria for the problem solution, they will never provide it all. The total criteria will come from your own frame of reference, from your goal, from the nature of the obstacle, and from outside sources. The total criteria will invariably test these things about each of the possible solutions:

1. Can we implement this solution?
2. Can we afford this solution?
3. Will this solution work?

It is important to remember that each of the possible solutions must be treated against each of the criteria. Which of the following best describes this testing process?

_____1. The testing of solutions begins with a very general evaluation of the solutions. In this evaluation, those solutions that are obviously unworthy are eliminated. The refined list is then subjected to a more detailed evaluation until one or more solutions remain, each of which meets all of the criteria. This list is then narrowed down to one best solution.

_____2. The testing of possible solutions involves the use of the combined criteria as a yardstick against which all of the possible solutions weighed. When this has been accomplished, your list of possible solutions will have been reduced to the one best solution by the elimination of all other solutions.

Choice one describes a testing process that proceeds from the general evaluation of the possible solutions to a very precise evaluation of the remaining solutions. This is the way in which the testing process proceeds, and, as choice one states, it may happen that your list will be narrowed down to more than one final solution, each of which meets all of the criteria that you have established. What do you do then? Select one of the responses that follow.

_____1. If we have more than one final solution, and each of these solutions meets all of the criteria, we decide on a final solution by asking our superiors which they prefer.

_____2. If we have more than one final solution, and each of these solutions meets all of the criteria, we decide on a final solution by deriving additional criteria against which to weigh these solutions.

The last choice is correct. Criteria are the only means by which we evaluate possible solutions to the problem.

If you recall, our tentative statement of the problem was to find ways to reduce mower breakdowns. We saw that the statement was far too broad to be dealt with affectively. It is also possible that the problem has not been correctly identified. With that in mind, let us bring you up-to-date on all of the data relevant to the problem. As a part of this data, there is a single statement that requires that we reevaluate the statement of the problem above for accuracy. See if you can identify that single statement in the list that follows. If you do identify it, draw a circle around it.

1. The company owns and operates 20 M4A rotary power mowers.
2. The total cost of mower maintenance for fiscal year 1966 was $855.00.
3. The cost of mower maintenance for the first half of fiscal year 1967 was $589.00.
4. The present status of the mowers is as follows:
   a. Two mowers are in operation and will require complete overhaul.
   b. Six mowers are in operation, but they require overhaul.
   c. Twelve mowers are in operation that require no servicing.
5. There is a two month's supply of minor parts on hand.
6. The estimated cost of mower maintenance for 1967 based on the first six month's operating cost is $1200.00.
7. Grass cutting can be accomplished with 18 operating mowers if there mowers do not break down.
8. Mowers are presently being abused by the operators, and this is the primary cause of major breakdowns.
9. Mower operators on the payroll must remain on the payroll through fiscal year 1967.
10. There is no positive way to control the abuse the mowers are receiving.
11. The total cost of mower maintenance for fiscal year 1967 cannot exceel the total cost for 1966.
12. The funds remaining for fiscal year 1967 are $266.00.
13. Grass must be cut according to the present schedule with a slight variation allowed according to needs.
14. All mowers with the exception of the two that are cut of service must remain in operating condition throughout the remainder of the year.
15. No new mowers can be purchased.
16. No money can be diverted to supplement the maintenance fund.

The statement above that requires that we take another look at the tentative statement of the problem is number ten. Did you spot it? With this bit of information it is illogical to assume that we can find ways to reduce mower breakdowns.

By referring to the complete data just presented, we should be able to finalize the statement of the problem. We know that the tentative statement is too broad, and we now know that it is unrealistic to look for ways to reduce mower breakdowns. With that in mind, which of the following is the most effective new statement of the problem?

_____1. To find ways to reduce the cost of mower maintenance for the remainder of fiscal year 1967 at a cost not to exceed $266.00.

The second choice is the more effective new statement of the problem for three reasons:

1. It is precise in stating what must be accomplished,
2. It specifies a time period, and
3. It limits the scope of the problem.

Here are a few solutions that we have suggested or hinted at in this text. Since we begin our test of possible solutions with the elimination of those solutions that are obviously unworthy of consideration, we want you to take care of this elimination process now. Draw a line through all of the following solutions that are not worthy of consideration.

1. Have your most capable maintenance men modify the mowers in such a way that they will not break down.
2. Convince the V. Pres. that power mower maintenance is a complicated and expensive task so that he will allocate more funds.
3. Contract to have the mowers maintained by a commercial firm for the amount of money remaining.
4. Contract to have the mowers maintained by a single individual for the amount of money remaining.
5. Utilize off duty personnel who are qualified in small motor repair to maintain the mowers for a minimum per hour wage rate.
6. Seek assistance from some other activity having vehicle mechanics assigned.

Of all the above possible solutions, only number three, four and five bear investigating further. You should have lined through solutions numbered one, two and six.

Let us suppose now that you investigated solutions three, four, and five and you have determined the following facts:

For solution number three, to have the mowers maintained by a commercial concern, the lowest bid was for $490.00.

For solution number four, to have the mowers maintained by a single individual, the lowest bid was for $265.00.

For solution number five, to use qualified off-duty personnel, there are 23 people available who will work for $1.50 per hour.

It is obvious from your investigation that one of the solutions is out of the question. That solution is which of the following?

_____1. To contract with a commercial concern.
_____2. To contract with a individual.
_____3. To utilize off-duty personnel.

The cost criterion definitely eliminates the first choice as a possible solution to the problem. This leaves us with two alternative solutions to the problem, and each of these solutions meets all of the criteria. This, then, brings us to the fifth step of the problem solving sequence, to select the best solution to the problem.

Step Five-Select The Best Solution To The Problem

This is a step in the problem solving sequence that may or may not exist. If in the previous step, the solutions were tested and narrowed down to just one remaining solution, then that solution would be the best solution to the problem. If, however, there is more than one solution, and each of the these solutions meets all of the criteria, then you must select the best solution from those remaining. We have already seen that this can only be done by establishing some additional criteria against which to measure each of the remaining solutions.

We now have two solutions meeting all of the criteria, and we must choose between them.

Contract to have the mowers maintained by an individual for the amount of money remaining.
Utilize off-duty personnel who are qualified in small motor repair to maintain the mowers for a minimum per hour wage rate.

We must now establish some additional criteria against which to measure each of the above solutions. The following are additional criteria that you might consider. Check those that you consider to be the most appropriate.

_____1. The solution selected must not interfere with the work of any other organization.
_____2. The solution should, if at all possible, contribute to the morale and welfare of all company personnel.
_____3. The solution should utilize company personnel in its execution.
_____4. The solution should be flexible enough to allow for alterations to insure that you remain within the limits of the available funds.

Now you think of a few additional criteria, and list them here.

5. _____

_____

_____

6. _____

_____

_____

With the Criteria just chosen, can you make a choice between the two remaining solutions? When you can, you have completed the problem solving process with the exception of one remaining step. Your task is not complete until you have implemented the problem solution.

Step Six- Implement The Problem Solution

For this step in the problem solving sequence, let us review the evolution of a problem such as one you may be handed at any time. For this review, let us assume that you are on the V. Pres's staff, and you are sitting in on one of the weekly staff meetings. During the course of the meeting, the V. Pres. probably state the problem? Check the response of your choice.

_____1. Fred, my people tell me that the traffic is jamming up around the main gate at quitting time. Would you see what could be done about this?

_____2. Fred, would you survey the traffic situation on the plant grounds and see if there are any rough spots?

It is more likely that the V. Pres. will spell the problem out to some degree as in choice one above.

Let us now suppose that you have gone through the entire problem solving process, and you have selected the one best solution to the traffic jam at the main gate. Which of the following would be the more accurate description of the V. Pres's interest at this point?

_____1. The V. Pres. would not be interested in what you identified the problem to be, nor would he be interested in how you went about solving it.
He expects you to solve the problem and then to implement the proper solution.

_____2. The V. Pres. expects to be kept informed as to what you identified the problem to be, what factors affected your choice of the final solution, what solutions you considered, and how you plan to implement the final solution.

The last choice is correct. This last choice describes what is known as completed staff work. Completed staff work gives the V. Pres. the chance to do these two things:

1. He can evaluate all of the factors that affected your choice of a final solution and
2. He can serve as the final approving authority for implementation of that solution.

If it were otherwise, the V. Pres. would be in a position of not being kept informed about matters that could conceivabie affect all of the members of his plant.

There is a conclusion to be reached from this brief look at the evolution of a problem. Which of the following is the most valid description of this conclusion?

_____1. Most problems that you will be called upon to solve in an operational or administrative capacity as an employee will be handed to you by a superior. It will then be up to you to select the best solution to the problem, to prepare the necessary implementation procedures, and to secure the superior's approval of both the solution and the implementation procedures.

_____2. Most problems that you will be called upon to solve in an operational or administrative capacity as a employee will be problems that you identify for yourself. Once this has been done, it will be up to you to select the best solution, to prepare the necessary implementation procedures, and to see to it that these procedures are carried out.

Choice number one describes completed staff work. For this reason, it is the correct choice.

At this point, we will return to the power mower problem for the last time to see how our final solution might be implemented.

Let us suppose, for the sake of this exercise, that the solution you selected was this:

Contract to have the mowers maintained by an individual for the amount of money remaining.

With our previous discussion of completed staff work to assist you, which of the following is more representative of the actions required to implement the solution above?

_____1. Notify the V. Pres. that you have found a way to effect the required savings. With this done, contact the individual you have identified as being able to perform the required services at the price agreed upon. Arrange to have the mowers delivered to him at a time and a place that is acceptable.

_____2. Submit a detailed report to the V. Pres. outlining the step you want through in reaching the solution. To this report, attach the necessary documents to implement the solution. Include, also, provisions for the V. Pres. to approve or to disapprove the solution and the implementation instructions.

The second choice, while not attempting to precisely define the form of completed staff work, is more representative of the type of action required.

Let us assume now that you decided on this solution instead of the previous one:

Utilize off-duty personnel who are qualified in small motor repair to maintain the mowers for a minimum per hour wage rate.

What are some of the documents and supporting material that might be required when you submit this solution in the form of completed staff work? List as many as you can think of.

1._____

2._____

3._____

4._____

5._____

Your list could have included such possibilities as the following:

1. Notification in the form of letters to V. Pres. or a notice to be placed in the daily bulletin to the effect that people are needed for this maintenance task.
2. Approval in the form of a letter to be signed by the V. Pres. to the effect that off-duty employees can participate in this activity.
3. The necessary documentation required to authorize a building to be set aside and equipped for this activity.
4. A notice to the fire marshal of the potentially hazardous activity to take place in the shop that is to be established.
5. A notice to the accounting and disbursing officer authorizing him to pay the wages from appropriated funds as required.
6. A letter of authorization for the use of company tools and equipment in this activity.

While you may not have listed the same items, we hope that you considered the complex requirements of completed staff work.